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CDM

environmental engineers, scientists, planners, & management consultants

CAMP DRESSER & McKEE INC.

7630 Little River Turnpike, Suite 500
Annandale, Virginia 22003
703 642-5500

April 3, 1985

U.S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Attention: Ms. Nancy Redgate

Subject: Engineering Report for the Surficial Cleanup and Disposal of Chemical Wastes SCR&D Bluff Road Site Columbia, South Carolina

Dear Ms. Redgate,

Camp Dresser & McKee Inc. (CDM) is pleased to submit this Engineering Report for the Surficial Cleanup and Disposal of Chemical Wastes at the SCR&D Bluff Road site in Columbia, South Carolina. This report is organized and presented in three sections:

- Section 1 provides a description of the site and a history of past site operations.
- Section 2 presents a chronological overview of CDM's involvement starting with the development of the contract documents and assistance during the bid process and concluding with an overview of the remedial cleanup activities.
- Section 3 presents a detailed response to Defender Vactor Systems request for change orders.

We trust that this report will satisfy your requirements. If you have any questions or comments or require further information please do not hesitate to contact me.

Very truly yours,

CAMP DRESSER & McKEE INC.

David F. Doyle

David F. Doyle, P.E.
Vice President

DFD/gm

cc: Mr. W. Kaschak, USEPA

#10

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APR. 4 1985

United States Environmental Protection Agency

ENGINEERING REPORT
for the
SURFICIAL CLEANUP AND DISPOSAL OF
CHEMICAL WASTES

SCR&D BLUFF ROAD SITE
COLUMIBA, SOUTH CAROLINA

April 1985

Camp Dresser & McKee Inc.
Consulting Engineers

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ENGINEERING REPORT
for
For Bluff Road, South Carolina

SECTION 1: INTRODUCTION

1.1 PURPOSE

This report presents a brief overview of the work performed by Camp, Dresser & McKee, Inc. for the preparation of the contract documents and assistance during construction associated with the surficial cleanup of the SCR&D Bluff Road Site in Columbia, South Carolina. It also presents our response to the Request for Change Orders submitted by Defender Vactor Systems, Inc. on August 29, 1983 for their work associated with the SCR&D Bluff Road Site cleanup contract.

1.2 SITE DESCRIPTION

The South Carolina Recycling and Disposal (SCR&D) Bluff Road Site is located in Richland County, South Carolina, on S.C. Highway 48 approximately 7 miles southeast of Columbia as shown on **Figures 1-1 and 1-2.** The site is a rectangular parcel having a frontage of 133 feet and a depth of 1,306 feet. The site is relatively level with elevations ranging from approximately 139 to 134 feet (USGS datum). The back portion (approximately one half of the area) is wooded and swampy in character. The front portion of the site, approximately 600 feet from the frontage property line, is cleared and has been used for various industrial and commercial purposes. Prior to the surficial cleanup contracts this front portion of the site contained a warehousing facility of approximately 9,400 square feet. The remainder of this front portion of the site was used as yard storage for containerized waste products (reportedly 7,500 drums in various states of deteriation) and equipment.

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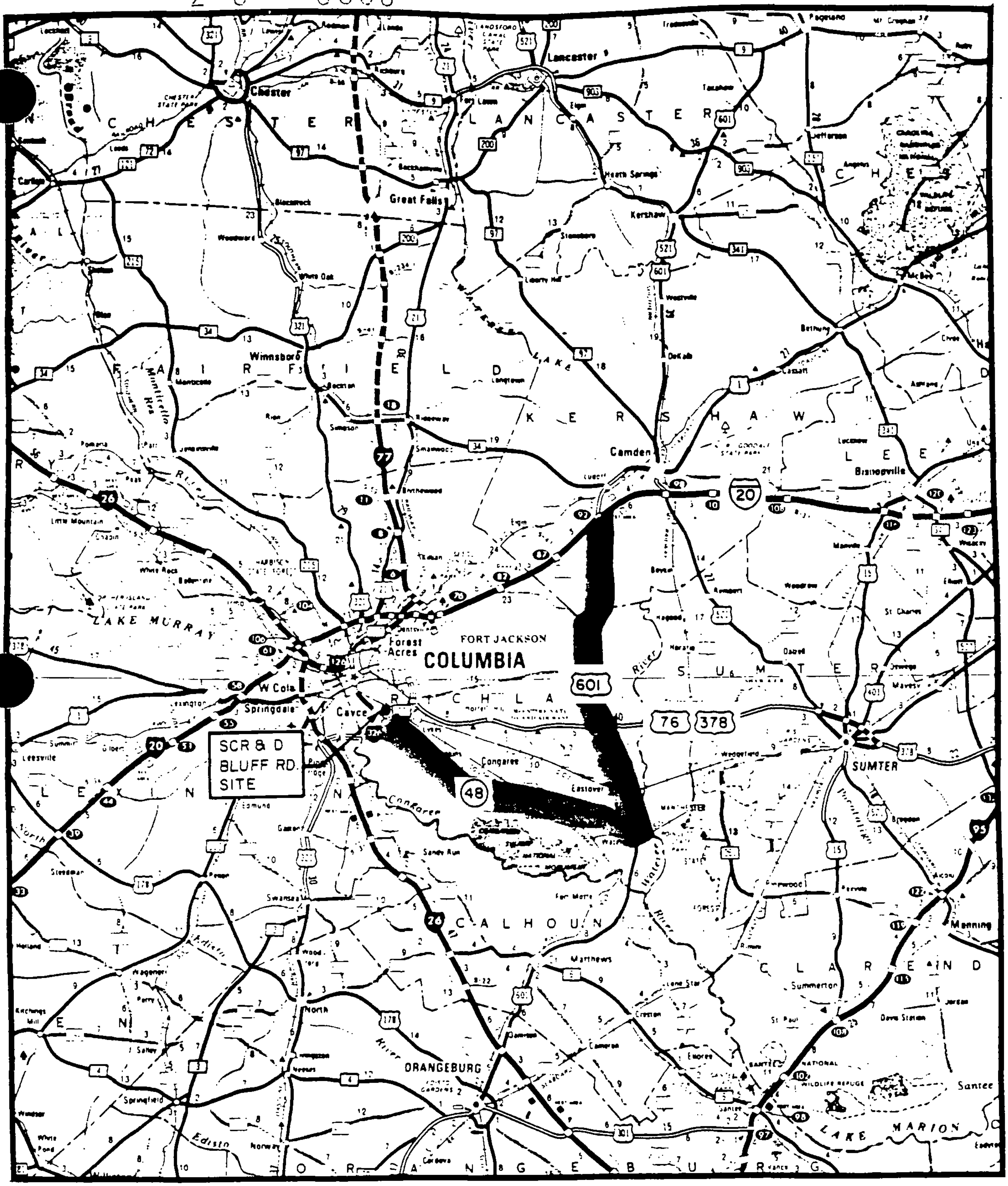


FIGURE 1-1

LOCUS MAP-SCR & D BLUFF ROAD SITE

COLUMBIA, SOUTH CAROLINA

CDM

environmental engineers, scientists, planners & management consultants

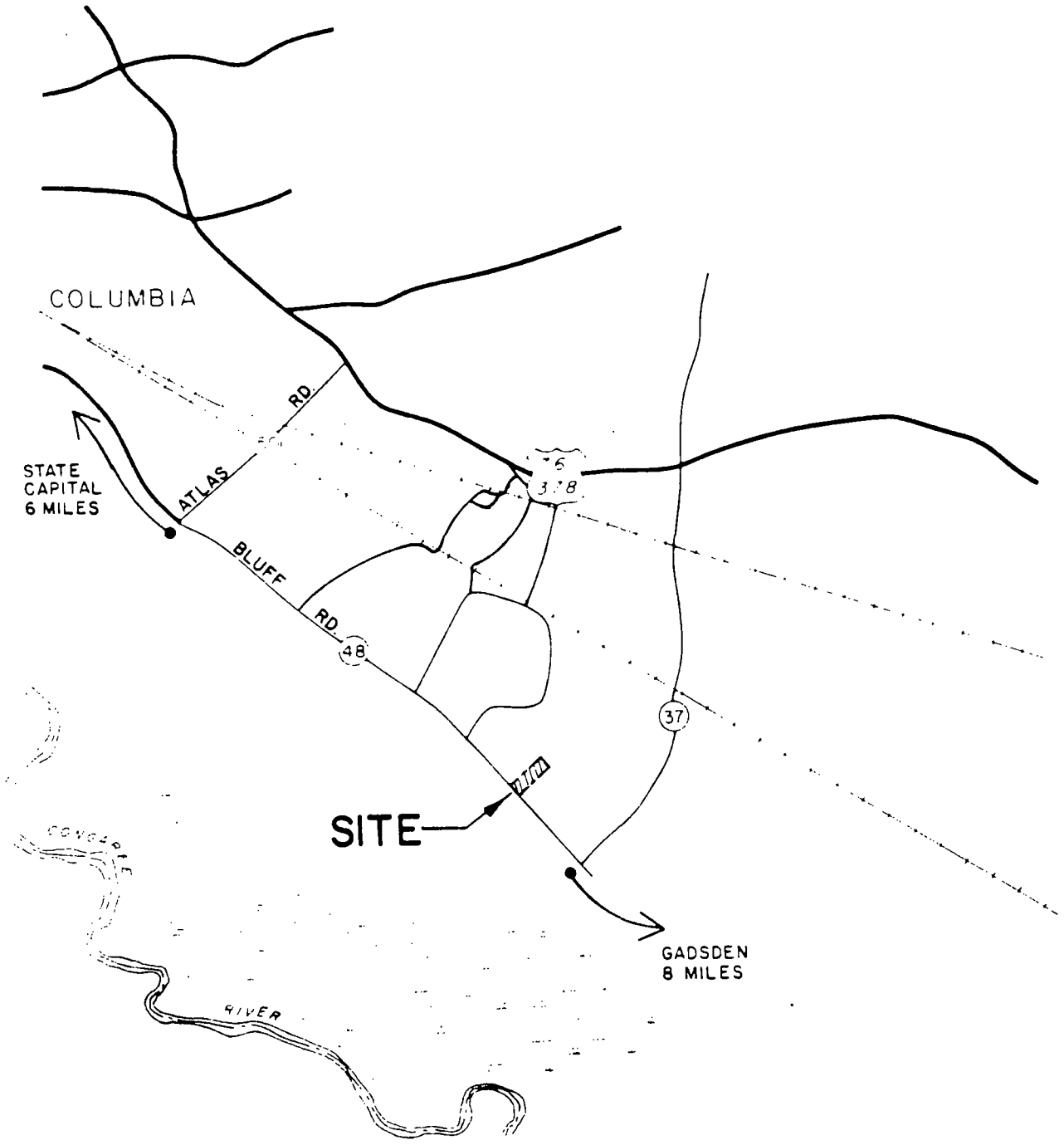


FIGURE 1-2

LOCATION MAP

SCR & D BLUFF ROAD SITE

COLUMBIA, SOUTH CAROLINA

CDM

1.3 SITE HISTORY

The first reported use of the site was as an acetylene manufacturing facility but no detailed information was available describing this reported use. Based upon information obtained from the South Carolina Department of Health and Environmental Control (DHEC), storage of chemicals at the site began in 1976 by SCR&D. Prior to this use, the site was a marshaling site for Columbia Organic Chemicals, a parent company to SCR&D.

In March 1980 the USEPA Surveillance and Analysis Division from Athens, Georgia performed a reconnaissance sampling of groundwater and surface water in the vicinity of the Bluff Road site. This sampling resulted in the identification of high levels of contamination associated with metals and organic compounds. This work was presented in a report "Groundwater and Surface Water Investigation, South Carolina Recycling and Disposal, Inc., Bluff Road Site, Columbia, South Carolina - July 1, 1980."

In January 1981 the Groundwater Protection Division, Bureau of Water Supply and Special Programs of DHEC prepared a report entitled "Investigation of Groundwater at South Carolina Recycling and Disposal Company Bluff Road Site, Richland County, South Carolina." This study further identified contamination resulting from the on-site activities at the SCR&D facility. It recommended that "the site not be permitted as a hazardous waste storage and treatment facility" and that the on-site "material should be taken to an appropriate facility designed to contain hazardous waste materials."

On March 23, 1982 a Partial Consent Decree was issued by USEPA which set the terms of an agreement by which Triangle Resources Industries (TRI) would perform the surficial cleanup of 75 percent of the on-site materials (drums) leaving "no more than 2,500 drums of solid or hazardous waste or substances of which there shall be no more than 500 lab packs." The cleanup was to be completed within 210 days of the receipt of the first disbursement from the Settlement Fund. The

cleanup work under this Partial Consent Decree was initiated by TRI on March 24, 1982 and completed ahead of schedule in early September, 1982. An aerial photograph of the Bluff Road site conditions prior to the start up of the TRI cleanup on March 24, 1982 is shown on **Figure 1-3.**

Figure 1-4 illustrates the condition of the site after TRI had completed the majority of their work under the Consent Decree.

Figure 1-3

SCR&D BLUFF ROAD SITE
Columbia, South Carolina

Existing Site Conditions Prior to March 1982

(SC HWY 48)
BLUFF ROAD
EXISTING TRAILER TO BE REMOVED
BEST AVAILABLE COPY
SCR & D BLUFF ROAD SITE
SURFICIAL CLEANUP AND DISPOSAL OF CHEMICAL WASTE
EXISTING CONDITIONS
CDM
1

FIGURE 1-4

SECTION 2: OVERVIEW OF CDM INVOLVEMENT

2.1 INTRODUCTION

CDM was notified by USEPA on August 12, 1982 that our assistance was required to prepare contract documents for the finalization of the surficial cleanup of the SCR&D Bluff Road Site. As previously stated, the surficial cleanup of 75 percent of the site was already being conducted by Triangle Resource Industries (TRI) working for the generators (RAD Services Inc.) in accordance with the Partial Consent Decree. CDM was to perform the work for USEPA under our Interim Zone Contract. Our work was to be in support of the Cooperative Agreement with the State of South Carolina acting through it's Department of Health and Environmental Control (DHEC).

In accordance with this request, CDM initiated work on August 16, 1982 with a kick-off meeting held at the DHEC offices in Columbia, S.C. In attendance at that meeting were representatives of: DHEC, the South Carolina Division of General Services, USEPA headquarters and Region IV staff, and CDM. At that meeting the method of contracting for the clean-up was discussed, the scope of work was developed and a tentative schedule of key dates was prepared which identified bid opening on October 4, 1982.

On August 19, 1982 Messrs. D. Doyle and D. Muldoon of CDM conducted an inspection and preliminary monitoring of the Bluff Road site and attended an informal on-site meeting with Messrs. J. Noles and R. Kirch of TRI. The purpose of this site inspection was to determine the specific requirements for the project i.e. site conditions, access requirements, equipment requirements, staffing needs and to view the on-going clean-up operations. The meeting with Messrs. Noles and Kirch of TRI was to

obtain any information on the types of wastes encountered, site problems associated with the clean-up, identification of any transporting and/or disposal issues and any other issues that could impact the next cleanup contract. The results of this meeting and site inspection were incorporated in the development of the contract documents.

2.2 DEVELOPMENT OF CONTRACT DOCUMENTS

2.2.1 Preparation of Contract Drawings

The first step in the development of the contract drawings or plans was to obtain an accurate scaled map of the Bluff Road site and any necessary adjacent area. This was accomplished by:

1. Obtaining the deed descriptions and assessors map of the Bluff Road site and adjacent property.

2. Researching any existing available mapping of the site.

3. Establishing site control and arranging for the preparation of a controlled aerial photograph at a scale of one inch equals twenty feet. This was done by Photo Science of South Carolina on August 30, 1982.

These aerial photographs were used to prepare base plans for use in developing the contract drawings. One of the problems that was encountered was associated with TRI finalizing their site cleanup during this period. Due to the aggressive schedule required by the State and USEPA, the development of the contract documents for the cleanup of the remainder of the site could not be delayed until TRI had completed their work. TRI initiated their cleanup of 75 percent of the chemical wastes and associated materials on March 23, 1982 and completed their work ahead of their required 210 calendar days in early September. On September 8

and 9, 1982 CDM along with support staff from Conestoga-Rovers & Associates performed an on-site review of the required work, did field monitoring of the site using direct reading instrumentation, performed a field check of the base plans and a physical inventory of the wastes and structures existing on-site.

Based upon the above information and evaluation, the following design parameters and constraints were considered in the development of the contract drawings:

1. A clean zone would be established in the front portion of the site to house the support trailers and appurtanent support items. Based upon our site monitoring, this would require installation of a vapor barrier.

2. Because of the extremely congested site, operations would have to be carefully scheduled and sequenced and circulation considered. An access/egress route was designed and a sequence of operations was developed to assist the contractor in planning and executing the cleanup operation.

3. Extensive negotiations were conducted to allow the contractor the use of the adjacent Roof and Helms properties. These properties were ultimately not permitted for use by the contractor due to potential liability for both the owner and the contractor.

As a result of these activities and the normal site design activities, the contract drawings were prepared. In addition to a cover sheet defining the project and presenting a locus and location plan, the following plans were prepared:

1. An Existing Conditions plan was prepared indicating the status of the site at the start of the contractor's operations. A reduced copy of this plan was previously shown as Figure 1-4. This plan was prepared from the actual aerial photograph of the site at a scale of one inch equals twenty feet and shows approximately the front 600 foot portion of the site as it existed on March 30, 1982. The plan also indicated seven designated waste storage areas and an estimate of the number of waste containers by type in each area. This plan was prepared to give the contractors an actual, visual presentation of the site and its areal constraints and to also present the waste containers inventoried on September 8 and 9, 1982.

2. A Site Plan was prepared at a scale of one inch equals twenty feet showing the layouts of the site access and egress roadways, a conceptual layout of the clean zone trailers and support items, the layout of the dirty zone decontamination facilities, the layout of the lab pack and initial staging area, and the existing seven designated waste container storage areas. This plan also contained the site preparation notes.

3. A drawing entitled Site Plan and Miscellaneous Details was prepared showing the rear portion of the site, the granular access roadway, the location and layout of the remote opening and stabilization area, and the explosive interim waste and shock sensitive disposal area. This drawing also presents the box detail for the stabilizing area, cross section of the access road, the layout and cross section of the remote opening area and a profile of the regrading of the clean zone.

4. A plan entitled Site Activity Areas was included which presented limits of the clean area, decontamination area and dirty area.

5. A plan of Miscellaneous Details was prepared showing the layout and cross section of the explosive interim storage and shock sensitive disposal area, the 48-inch diameter wet well, a typical pipe bedding detail, the berm detail for the initial staging area, and the details for the construction of the equipment decontamination facility.

2.2.2 Development of the Project Manual

The table of contents for the specifications or the project manual for the surficial cleanup of the SCR&D Bluff Road is shown on Table 2-1. As shown these specifications can basically be broken down into two distinct areas:

1. Development of the front portion of the specifications normally referred to as the "boiler plate" and covering the bidding requirements and the contract forms.

2. Development of the technical specifications defining the actual work to be done using the Construction Specifications Institute (CSI) format and covering; a part 1 - general, defining the work to be done; a part 2 - products, defining the materials to be used and a part 3 - execution, defining how the work is to be done. Along with the technical specifications is included the technical appendices which are provided to further clarify or define the work or conditions under which the work is to be accomplished.

An overview of the key requirements presented in the Bidding Requirements are:

TABLE 2-1

TABLE OF CONTENTS

- The contractors were required to submit a statement of qualifications which would be reviewed only for that bidder or bidders considered for award.

- It was identified that cleanup work at the site has been accomplished by another independent contractor and information concerning the waste transported and disposed under this contract is available for examination at the contract document repositories.

- A mandatory pre-bid conference was required to be attended for all prospective bidders. Only contractors who attended this conference could be allowed to bid on the project. This was made a requirement since it was determined due to liability potential associated with health and safety concerns that contractors would not be allowed to go on site and view the proposed work. The mandatory pre-bid conference was not only held to describe the work to be performed and address contractor questions but also to present a pictorial (slide presentation) of the existing site conditions.

- Unbalanced bids and bids which did not contain the bidders qualifications were subject to rejection.

- Subcontractors whose prices exceeded 2 1/2 percent of the prime contractors total bid had to be listed. Subcontractors were defined as:

  a. Those who perform work or render service to the prime contractor to or about the construction,

  b. Those who supply and/or install materials fabricated to a special design,

  c. Those who supply and/or install equipment fabricated to a special design,

d. Those who supply transport, pretreatment, storage or disposal services as a part of the clean-up operations.

- The contract was federally assisted and federal requirements, as defined and wage rates as included, applied to the contract.

- Federal safety and health regulations applied to the contract as well as the requirement for the contractor to have a person on-site to supervise the work and insure compliance with OSHA.

- The successful contractor was required to pay all applicable South Carolina sales and use taxes.

- Representatives of the USEPA, USDOJ and of the State or agencies having a direct interest in the work had the right of access and inspection of the contractor's records.

- The contract time was defined as 90 days starting 20 days after the effective date of the Agreement.

- The Bureau of Solid and Hazardous Waste Management of the State of South Carolina was defined as the Engineer in connection with the execution of the work.

- Liquidated damages were set at 500 dollars for each calendar day of delay beyond the contract time.

- The South Carolina Division of General Services, Materials Management Office was defined as the Owner for the purposes of the contract.

- The required insurance limits were established.

- The contractor was named the generator for the purpose of executing the contract scope.

- The requirement under South Carolina law for the generator to pay $1.50 per ton of waste disposed to the State Contingency fund was defined.

- Change orders were to be effective only after approval by the South Carolina State Budget and Control Board.

- Three working days per calendar month would be anticipated as normally bad weather and would not be considered justification for an extension of time.

- The Contractor had a requirement to notify the Owner and Engineer of delays within ten days of the beginning of such delay. The Engineer was required to ascertain the facts and notify the Contractor within ten days of the Owners decision. No claims for extension of time would be considered if the Contractor could be reasonably expected to have full knowledge of the basis for the claim at the time of bidding.

A summary of the technical specifications is presented, following the sequence presented in the Table of Contents. A brief overview of each section in Division 1 - General Requirements is presented as follows:

- Summary of Work provides a description of the work to be performed, and presents a detailed sequence of operations.

- Existing Utilities presents a summary of the available utility service for potable water, telephone and electric power, and the responsibilities for both parties, owner and contractor concerning these utilities.

- Special Project Procedures defines the key terms and functions required for the execution of the work. It also defines the requirements of the health and safety plan including work areas, training, medical surveillance, security, communications, emergency and first aid requirements, personal safety and related equipment, personal hygiene, air monitoring, contaminant control, dust control, drum and container sampling, posted regulations, and transportation of wastes. To restrict the movement of hazardous materials from the site through populated areas or past sensitive receptors, a description of the required waste transport route was given and a map of the route was provided in the Appendix.

- Regulatory Requirements states that USEPA and South Carolina DHEC would waive certain of their regulatory requirements associated with on-site work for the purposes of expediting this remedial action. This section also identified the regulatory requirements for on-site work, transportation, and off-site disposal.

- Measurement and Payment presents the detailed method of measurement of the work performed and how payment for that work would be made. The Measurement and Payment section provides for 53 separate payment items and was subdivided into seven separate sections covering project startup, temporary services, site services, materials, site preparation, waste handling and disposal, and project closeout.

- Job Site Administration covers those contractor services required to assure site safety, site security, site communications, project management and recordkeeping, and custodial services.

- o Submittals section addresses the submittals required for the execution of the contract including the contingency plan, construction schedule, and shop drawings. The section defines what is to be included in these submittals and the submittal procedures.

- o Temporary Facilities covers the requirements for the State site office, security and communications, site laboratory, emergency medical facility, personal hygiene, equipment storage, and parking and materials staging.

- o Contract Closeout defines the requirements for the acceptable final completion of the project.

A brief overview of each section Division 2 - Site Work and Division 3 - Concrete and Reinforcing Steel are presented as follows:

- o Demolition of Site Structures covers the work necessary to dismantle the superstructures of the metal clad buildings existing on site.

- o Site Preparation identifies the requirements for the construction of waste handling areas, materials staging areas, gravel access roads, equipment and materials decontamination facility, and storage of existing equipment and materials.

- o Chain Link Fence and Concrete and Reinforcing Steel describes the materials and installation requirements.

- o Base Preparation and Liner for Drum Staging and Storage Facilities defines the materials and construction methods for the drum staging and storage facilities.

A brief overview of each section in Division 13 - Special Conditions is presented as follows; Division 4 through 12 cover items not included in this contract and therefore were not used.

- Drum Handling Protocol specifies the procedures for the handling and transport of drums or other hazardous waste containers.

- Bulking and Consolidation Protocol specifies the protocol the Contractor must follow when bulking and consolidating wastes. This protocol includes a series of eight charts which present analytical methods and a "decision tree" approach to waste consolidation.

- Securing and Disposal of Explosive and Shock Sensitive Waste specifies the disposition of explosive and shock sensitive wastes encountered on site.

- Disposal of Chemical Wastes identifies the waste categories found at the site during the previous cleanup, identifies waste types which could be encountered, and requires the Contractor to specify his detailed method of disposing of these wastes.

- Collection and Handling of Sludges specifies the method of collecting and handling sludges found in tanks, drums, and other containers on the site.

- Transporting of Hazardous Material identifies the requirements for transporting materials classified as explosive waste.

- The section on Sorting, Identification, Packing and Disposal of Packaged Laboratory Chemical Wastes (Lab Packs) covers the unpacking, handling, sorting, identification, repacking and disposal of materials found in lab packs.

- The last section covers the Securing, Identification, Transport and Disposal of Pressurized Cylinders Containing Toxic, Explosive and/or Other Materials.

In addition to these technical specification sections, appendix information was provided which:

- Presented the general precautions associated with the handling and storage of gas cylinders.

- Presented disposal procedures for leaking gas cylinders.

- Provided a road map indicating the required waste disposal transport route. This route was field determined and specified to insure the Contractor did not transport waste through populated areas or near sensitive receptors.

- Copies of letters were included from the South Carolina DHEC to the Richland County Civil Defense Director which summarized the quantities, class and date shipped of the wastes previously removed from the Bluff Road site.

- A copy of memorandum was included which was requested by CDM to be send to CDM from DHEC's attorney. This memorandum summarized the court proceedings of August 5, 1982 and substantiated that DHEC had agreed to furnish a citizens committee with a list of chemical wastes to be destroyed by detonation prior to such detonation.

- o A copy of a draft procedure entitled "U.S. Environmental Protection Agency Lab Pack Disposal Procedures" was included to provide for a safer and more efficient means of processing lab packs.

2.2.3 Preparation of Remediation Cost Estimate

There are basically four steps required in the preparation of a remediation/construction cost estimate. These are:

1. Determine the method of contracting for the work to be accomplished. There are basically three methods of doing this: lump sum - a single cost for the entire job or task; unit cost - paying a unit price for the accomplishment of an agreed upon unit of work; and time and materials - paying the Contractor fixed rates for personnel, equipment and materials used on the project.

2. Determine the methods of measuring and paying for the work to be accomplished.

3. Estimate the quantities of work to be accomplished for the remediation in accordance with the determined method of measurement.

4. Estimate the unit cost of the work to be accomplished, in accordance with the determined method of payment.

In developing the remedial cleanup cost estimate for the SCR&D Bluff Road site, these were the steps that were followed. First, it was agreed by all parties concerned, USEPA, DHEC and CDM that the project should be contracted for using the unit price method. For those items that did not readily lend themselves to the unit price approach, a lump sum method was utilized.

Second, an analysis was made of all the work to be accomplished in cleaning up the site. This included the regulatory requirements, special project procedures, the constricted working area, temporary facilities, site preparation activities, demolition, waste handling and disposal, and any other factors which could affect, directly or indirectly, the cost of the remedial cleanup. Using this information, the method of measurement and payment for the remedial cleanup was established. The measurement method was identified which would be the most expedient to use in the field, i.e., gallons, per drum, per ton, lump sum, per cubic yard, etc.

Consistent with this activity, an estimate of the actual quantities involved in the remedial cleanup was made. The first step was to review all of the available information concerning amount and types of waste disposed at the site and evaluate the manifests concerning waste removed from the site during the previous private cleanup contract. The information obtained during our site meeting with the J. Noles and R. Kirch of TRI on August 19, 1982 and our discussions with DHEC staff who monitored this private cleanup was also factored into our estimate. On September 8 and 9, 1982, CDM along with support staff from our subcontractor Conestoga-Rovers & Associates conducted an on-site inventory of the waste containers. The results of this inventory was presented for the seven specified site areas and identified 2,154 drums on site in the following categories.

- Empty - 22 drums
- Lab Packs - 250 drums (actually seen)
- Poly Packs - 218 drums
- Bung Tops - 491 drums
- Ring Tops - 1,173 drums

In addition to the above inventory, 700 - one gallon amber bottles were counted.

Using the above presented information, our experience, and balancing the quantities expected by type of container, an estimate was prepared which defined the quantities expected to be encountered in the execution of the work. This information was also used in establishing the time for completion of the work. Our estimated quantities included 796 lab packs which was 296 more than permitted in the partial consent decree. The actual number of lab packs found on site and processed according to Alert Analytical Laboratories, a subcontractor to Defender Vactor Systems, was 807.

Once the quantities were determined the unit costs, which can vary with quantity, were estimated. The unit costs were estimated by:

1. Reviewing the unit costs of similar types of work at other hazardous waste sites.

2. Contacting hazardous waste remediation contractors and obtaining unit costs to perform identified site preparation and cleanup tasks.

3. Contacting hazardous waste disposal sites and determining which wastes were permitted, chemical analysis required for disposal, capacity available and cost to dispose.

4. Transportation costs were estimated by calculating the haul mileage and interviewing waste haulers.

5. Contingencies were then factored in to cover the size and location of the project, the site conditions which were extremely congested, the limited staff which could be efficiently used to accomplish the work and the expected operating conditions, weather and time required for completion.

Based upon the information gathered above, the analysis performed, and our experience with the execution of these types of projects, we estimated the cost to complete this contract at $904,000.

2.3 ASSISTANCE DURING THE BID PROCESS

On September 20, 1982, only 27 working days after our request from USEPA to proceed with the development of the contract documents, the contract documents; plans, specifications and cost estimate were finalized and the first advertisement for bidders published.

The mandatory pre-bid conference was held on September 29, 1982 at the DHEC office at Bull Street, Columbia, South Carolina. As previously stated, since it was determined that the contractors would not be allowed to go on site and familiarize themselves with the actual site conditions due to liability associated with health and safety issues, a detailed slide presentation of the site was made. The pre-bid conference required a sign-in by the contractors attending. A handout showing the camera position and direction for the thirty slides presented, as well as the inventory of waste containers was given to each attendee. The entire pre-bid conference was taped, and rendered site maps and detail sheets were displayed as an aid to responding to questions.

The presentation agenda for the pre-bid conference was:

- Introduction - R. Wright, USEPA - Region IV
- Method of Cleanup Administration - R. Malpass, DHEC
- Overview of Contract Requirements - D. Doyle, CDM
- Description of the Site - D. Doyle, CDM/R. Malpass, DHEC (slide show)
- Questions - D. Doyle, CDM - Moderator

The bids were received on October 20, 1982 at 3:00 p.m. at which time they were publicly opened and read aloud. As shown on Table 2-2, Comparison of Bids - I the three low bidders were:

1. OH Materials Inc. - $679,537.70
2. CEOS International - $838,103.00
3. Defender Vactor Systems - $852,374.82

Due to a ruling that the waste disposal facility constituted a subcontractor in accordance with South Carolina law all bids were rejected and the contract was readvertised and re-bid.

On December 6, 1982 the contract was readvertised. The only changes made from the previous contract were:

- The bidding requirements were made more definitive regarding the identification of subcontractors performing off-site pretreatment or ultimate disposal of wastes.

- Minor modifications were made to the contract drawings restricting the use of the abutting Roof and Helms properties which were excluded from use by addendum in the first contract bid.

- Minor adjustments were made to the estimated quantities.

- The addenda to the first contract bid were incorporated into the Contract Documents.

A second pre-bid conference was at DHEC's office in Columbia, South Carolina on January 4, 1983. Again, this pre-bid conference was mandatory for those contractors who intended to bid the project and did not attend the first pre-bid conference held in September 1982. The

CAMP DRESSER & MCKEE, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

TABLE 2-2

COMPARISON OF BIDS

BIDS RECEIVED OCTOBER 20, 1982

3 P.M.

CONTRACT OF SURFICIAL CLEANUP AND
DISPOSAL OF CHEMICAL WASTES
SCR&D BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

Item No.	Description	Estimated Quantity	Unit	O.H. Materials Co. P.O. Box 551 Findley, OH 45840 Unit Price	O.H. Materials Co. Amount	Cecos International 2321 Kenmore Avenue Kenmore, NY 14217 Unit Price	Cecos International Amount	Defender Vactor Systems P.O. Box 775 Columbia, SC 29202 Unit Price	Defender Vactor Systems Amount
SECTION A - PROJECT START UP									
1.	Insurance, Bonds and Permits	1	L.S.	$ 13,267.00	$ 13,267.00	$ 22,000.00	$ 22,000.00	$ 15,500.00	$ 15,500.00
2.	Mobilization	1	L.S.	11,061.00	11,061.00	38,700.00	38,700.00	4,650.00	4,650.00
3.	Medical Examinations	35	Persons	115.00	4,025.00	577.00	20,195.00	271.40	9,499.00
SECTION B - TEMPORARY FACILITIES									
1.	State Site Office	1	L.S.	5,000.00	5,000.00	1,300.00	1,300.00	4,050.00	4,050.00
2.	Security & Communications	1	L.S.	3,000.00	3,000.00	1,400.00	1,400.00	8,100.00	8,100.00
3.	Laboratory	1	L.S.	26,980.00	26,980.00	16,500.00	16,500.00	38,000.00	38,000.00
4.	Emergency Medical Facility	1	L.S.	700.00	700.00	2,300.00	2,300.00	2,800.00	2,800.00
5.	Personnel Hygiene Facility	1	L.S.	14,500.00	14,500.00	10,400.00	10,400.00	12,000.00	12,000.00
SECTION C - SITE SERVICES									
1.	Safety Officer	50	workdays	315.00	15,750.00	280.00	14,000.00	500.00	25,000.00
2.	Custodian	45	workdays	194.00	8,730.00	95.00	4,275.00	100.00	4,500.00
3.	Security (Continuous including Security Officer)	90	calendar days	131.00	11,790.00	133.00	11,970.00	720.00	64,800.00
4.	Photographic Identification for all on-site Personnel	50	each	10.00	500.00	2.00	100.00	7.00	350.00
5.	Personal Safety Equipment Protective Clothing	35	per person	1,100.00	38,500.00	45.00	1,575.00	1,303.00	45,605.00
SECTION D - MATERIALS									
1.	Granular Material (Road)	750	tons	6.94	5,205.00	9.50	7,125.00	19.78	14,835.00
2.	Filter Fabric	1,350	sq. yd.	3.98	5,373.00	1.20	1,620.00	.77	1,039.50
3.	Repack Drums	995	each	20.00	19,900.00	18.00	17,910.00	15.75	15,671.25
4.	Overpack Drums	900	each	65.00	58,500.00	77.00	69,300.00	57.75	51,975.00
5.	Common Fill	200	cu. yd.	9.00	1,800.00	9.75	1,950.00	2.94	588.00
SECTION E - SITE PREPARATION									
1.	Staging and Sampling Area	1	L.S.	7,855.00	7,855.00	17,900.00	17,900.00	22,395.00	22,395.00
2.	Lab Pack staging, sorting, and repacking area	1	L.S.	3,145.00	3,145.00	900.00	900.00	8,970.00	8,970.00
3.	Unknown lab pack components remote opening & disposal area	1	L.S.	4,090.00	4,090.00	3,700.00	3,700.00	7,868.00	7,868.00

Item No.	Description	Estimated Quantity	Unit	O.H. Materials Co. Findley, OH 45840 Unit Price	O.H. Materials Co. Findley, OH 45840 Amount	Cecos International Kenmore, NY 14217 Unit Price	Cecos International Kenmore, NY 14217 Amount	Defender Vactor Systems Columbia, SC 29202 Unit Price	Defender Vactor Systems Columbia, SC 29202 Amount
4.	Equipment Decontamination Facility with wet well & pumpage system	1	L.S.	9,581.00	9,581.00	9,000.00	9,000.00	9,350.00	9,350.00
5.	Explosive Waste Interim Storage & Shock Sensitive Disposal Area	1	L.S.	5,970.00	5,970.00	16,900.00	16,900.00	14,614.00	14,614.00
6.	Interim Storage & Final Placement of existing on-site equipment & materials	1	L.S.	1,138.00	1,138.00	400.00	400.00	1,000.00	1,000.00
7.	Supply & install new 7 ft. high chain link fence at southerly portion of site	185	L.F.	14.70	2,719.50	13.50	2,497.50	13.25	2,451.25
8.	Supply & install 16 ft. wide, single leaf, vehicle chain link gate	3	each	333.00	999.00	840.00	2,520.00	210.00	630.00
9.	Supply & install liner and regrade temporary services area as detailed on sheet	1	L.S.	7,464.00	7,464.00	10,600.00	10,600.00	18,973.00	18,973.00
10.	Removal of fence & reset	375	L.F.	14.70	5,512.50	5.00	1,875.00	---	---
	SECTION F - WASTE HANDLING & DISPOSAL								
1.	Disposal of Water Reactive Wastes, Solid	2	Drum	143.00	286.00	15,425.00	30,850.00	1,519.50	3,039.00
2.	Disposal of Water Reactive Wastes, Liquid	100	Gal.	2.99	299.00	308.00	30,800.00	32.38	3,238.00
3.	Disposal of Strong Reducer, Solid	2	Drum	143.00	286.00	230.00	460.00	1,519.50	3,039.00
4.	Disposal of Strong Oxidizer, Solid	2	Drum	143.00	286.00	220.00	440.00	1,519.00	3,039.00
5.	Disposal of Strong Oxidizer, Liquid	100	Gal.	2.99	299.00	308.00	30,800.00	26.18	2,618.00
6.	Disposal of Organic Liquid Low Halogen Concentration ($\leq$2% Halides)$<$50 ppm PCB	2970	Gal.	2.53	7,514.10	3.00	8,910.00	4.02	11,939.40
7.	Disposal of Organic Liquid, High Halogen Concentration ($>$2% Halides)$<$50 ppm PCB	700	Gal.	4.00	2,800.00	4.70	3,290.00	9.93	6,951.00
8.	Disposal of Aqueous Acids, pH $<$ 2.0	7205	Gal.	1.77	12,752.85	2.35	16,931.75	2.58	18,588.90
9.	Disposal of Alkalines pH $>$ 12.5	2255	Gal.	1.77	3,991.35	2.25	5,073.75	3.35	7,554.25
10.	Disposal of Aqueous Base Contaminated with Cyanide	150	Gal.	2.98	447.00	4.65	697.50	27.38	4,107.00
11.	Disposal of Aqueous Base Contaminated with Sulfide	150	Gal.	2.98	447.00	5.35	802.50	27.38	4,107.00
12.	Disposal of Drummed Solids, $>$500 ppm PCB	12	Drum	156.00	1,872.00	206.00	2,472.00	142.92	1,715.04
13.	Disposal of Drummed Solids 50 ppm$<$PCB$<$500 ppm	605	Drum	156.00	94,380.00	114.00	68,970.00	103.61	62,684.05

CAMP DRES[redacted]KEE, INC. COMPARISON OF BIDS - C[redacted]ED SCR & D BLUFF ROAD

Item No.	Description	Quantity	Unit	O.H. Materials Co. Findley, OH 45840 Unit Price	O.H. Materials Co. Findley, OH 45840 Amount	Cecos International Kenmore, NY 14217 Unit Price	Cecos International Kenmore, NY 14217 Amount	Defender Vactor Systems Columbia, SC 29202 Unit Price	Defender Vactor Systems Columbia, SC 29202 Amount
14.	Disposal of Bulk Solids, PCB < 50 ppm	320	C.Y.	94.38	30,201.60	127.00	40,640.00	183.27	58,646.40
15.	Disposal of Liquids, 50 ppm < PCB < 500 ppm	250	Gal.	7.60	1,900.00	5.70	1,425.00	8.59	2,147.50
16.	Disposal of Liquids, PCB > 500 ppm	100	Gal.	2.99	299.00	8.00	800.00	19.83	1,983.00
17.	Disposal of Explosive Wastes	100	Lbs.	14.66	1,466.00	130.00	13,000.00	6,150.00	12,300.00*
17A.	Disposal of Shock Sensitive Wastes	200	Lbs.	14.66	2,942.00	25.00	5,000.00	----	----
18.	Disposal of Lab Packs	796	Drum	209.30	166,602.80	246.50	196,214.00	169.69	135,073.24
19.	Disposal of Empty Drums	1339	Drum	8.00	10,712.00	17.00	22,763.00	11.36	15,211.04
20.	Disposal of Base Neutral Aqueous, including decontamination & wash waters, < 50 ppm PCB, no Cyanide, no Sulfide	39700	Gal.	.61	24,217.00	.71	28,187.00	1.89	75,033.00
21.	Disposal of Pesticides/ Herbicides, Liquid	100	Gal.	2.99	299.00	2.50	250.00	21.15	2,115.00
22.	Disposal of Pesticides/ Herbicides, Solid	2	Drum	150.00	300.00	157.00	314.00	1,070.50	2,141.00
23.	Collection & Handling of Sludges	100	Drum	73.02	7,302.00	133.00	13,300.00	18.91	1,891.00
SECTION G - PROJECT CLOSEOUT									
1.	Project Closeout	1	L.S.	14,591.00	14,591.00	6,800.00	6,800.00	8,000.00	8,000.00
TOTAL					$ 679,537.70		$ 838,103.00		$ 852,374.82

ADDITIONAL BIDDERS		TOTAL CORRECTED BID PRICE
4.	Triangle Resource Industries	949,210.00
5.	SCA Services, Inc.	1,044,995.81
6.	Environmental Emergency Services	1,051,537.77
7.	Chem-Nuclear Systems, Inc.	1,098,966.45
8.	D'Appolonia Waste Isolation Inc.	1,274,562.20
9.	Resource Technology Services, Inc.	1,350,962.30

* Based on 2 drums of Explosive and Shock Sensitive
Does not reflect Addendum No. 4

agenda for this pre-bid conference was the same as the previous:

- o Introduction - R. Wright, USEPA - Region 4
- o Method of Cleanup Administration - R. Malpass, DHEC
- o Overview of Contract Requirements - D. Doyle, CDM
- o Description of the Site (a presentation of 30 slides providing a walking tour of the site) - D. Doyle, CDM
- o Questions - D. Doyle, CDM/Moderator

The bids were received on January 12, 1983 at 3:00 pm at which time they were opened and read aloud. As shown in Table 2-3 Comparison of Bids - II, the three low bidders were:

1. Defender Vactor Systems - $519,220.30
2. CECOS International - $628,169.68
3. OH Materials - $675,543.00

After preparing the tabulation of the bids as presented in Table 2-3, CDM's contractual involvement in the Bluff Road project was completed. On February 7, 1983 DHEC issued Defender Vactor Systems a Notice-of-Award for the Surficial Cleanup and Disposal of Chemical Wastes at the SCR&D Bluff Road Site. The 110 day contract time for completion was started with the issuance of this notice.

2.4 REMEDIAL CLEANUP

As stated CDM completed its contractual requirements upon acceptance, by DHEC and USEPA of the bid results. At this point in the job process, DHEC staff assumed responsibility for the on-site resident services to monitor the contractor's work and insure compliance with the contract documents.

CAMP DRESSER & McKEE INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

TAB 3

COMPARISON OF BIDS - II

BIDS RECEIVED JANUARY 12 [illegible]
3:00 P.M

SUPERFICIAL CLEANUP AND DISPOSAL OF CHEMICAL WASTES
SCR&D BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

Item	Description	Estimated Quantity	Unit	Defender Vactor Systems Inc. Rt. 1 Box 100 Eastover, SC 29044 Unit Price Numerical	Defender Vactor Systems Inc. Rt. 1 Box 100 Eastover, SC 29044 Total Price Numerical	CECOS International 2321 Kenmore Road Buffalo, NY 14207 Unit Price Numerical	CECOS International 2321 Kenmore Road Buffalo, NY 14207 Total Price Numerical	OH Materials Co. Box 551 Findlay, OH 45840 Unit Price Numerical	OH Materials Co. Box 551 Findlay, OH 45840 Total Price Numerical
SECTION A - PROJECT START-UP									
1.	Insurance, Bonds and Permits	1	L.S.	$ 14,000.00	$ 14,000.00	$ 12,170.90	$ 12,170.90	$ 13,267.00	$ 13,267.00
2.	Mobilization	1	L.S.	9,532.45	9,532.45	25,072.00	25,072.00	11,061.00	11,061.00
3.	Medical Examinations	35	Person	265.00	9,275.00	516.15	18,065.25	230.00	8,050.00
SECTION B - TEMPORARY FACILITIES									
1.	State Site Office	1	L.S.	$ 1,800.00	$ 1,800.00	$ 3,653.00	$ 3,653.00	$ 2,000.00	$ 2,000.00
2.	Security and Communications	1	L.S.	1,800.00	1,800.00	1,382.00	1,382.00	1,500.00	1,500.00
3.	Laboratory	1	L.S.	33,000.00	33,000.00	15,204.00	15,204.00	16,000.00	16,000.00
4.	Emergency Medical Facility	1	L.S.	600.00	600.00	2,225.00	2,225.00	700.00	700.00
5.	Personnel Hygiene Facility	1	L.S.	4,100.00	4,100.00	8,993.00	8,993.00	10,400.00	10,400.00
SECTION C - SITE SERVICES									
1.	Safety Officer	50	Work Day	$ 300.00	$ 15,000.00	$ 217.58	$ 10,879.00	$ 335.00	$ 16,750.00
2.	Custodian	45	Work Day	36.00	1,620.00	80.27	3,612.15	246.00	11,070.00
3.	Security (Continuous including Security Officer)	90	Calendar Day	108.00	9,720.00	111.16	10,004.40	131.00	11,790.00
4.	Photographic Identification for all on-site Personnel	50	ea.	4.95	247.50	1.06	53.00	10.00	500.00
5.	Personal Safety Equipment Protective Clothing	35	Person	805.00	28,175.00	1,209.43	42,330.05	1,100.00	38,500.00
SECTION D - MATERIALS									
1.	Granular Material	750	ton	$ 5.72	$ 4,290.00	$ 11.13	$ 8,347.50	$ 6.94	$ 5,205.00
2.	Filter Fabric	1,350	sq.yd.	.69	931.50	1.27	1,714.50	1.35	1,822.50
3.	Repack Drums	995	ea.	15.60	15,522.00	15.92	15,840.40	20.00	19,900.00
4.	Overpack Drums	100	ea.	55.51	5,551.00	67.02	6,702.00	65.00	6,500.00
5.	Common Fill	200	cu.yd.	5.22	1,044.00	9.05	1,810.00	9.00	1,800.00
SECTION E - SITE PREPARATION									
1.	Staging and Sampling Area	1	L.S.	$ 11,953.90	$ 11,953.90	$ 10,555.12	$ 10,555.12	$ 13,855.00	$ 13,855.00
2.	Lab pack staging, sorting and repackaging area	1	L.S.	857.94	857.94	1,904.00	1,904.00	2,000.00	2,000.00
3.	Unknown lab pack components remote opening & disposal area	1	L.S.	12,912.20	12,912.20	3,969.00	3,969.00	4,790.00	4,790.00
4.	Equipment Decontamination Facility with wet well and pumpage system	1	L.S.	19,964.00	19,964.00	10,890.00	10,890.00	10,581.00	10,581.00
5.	Explosive Waste Interim Storage and Shock Sensitive Disposal Area	1	L.S.	13,238.72	13,238.72	12,339.00	12,339.00	13,000.00	13,000.00
6.	Storage and placement of existing on-site equipment and material	1	L.S.	600.00	600.00	446.00	446.00	500.00	500.00

Item	Description	Estimated Quantity	Unit	Defender Systems Inc. Rt. 1 Box 100 Eastover, SC 29044 Unit Price Numerical	Defender Systems Inc. Rt. 1 Box 100 Eastover, SC 29044 Total Price Numerical	CECOS International 2321 Kenmore Road Buffalo, NY 14207 Unit Price Numerical	CECOS International 2321 Kenmore Road Buffalo, NY 14207 Total Price Numerical	OH Materials Co. Box 551 Findlay, OH 45840 Unit Price Numerical	OH Materials Co. Box 551 Findlay, OH 45840 Total Price Numerical
SECTION E - SITE PREPARATION (Cont.)									
7.	Furnish and install new 7 ft high chain link fence at southerly portion of site	365	lin.ft.	$ 13.00	$ 4,745.00	$ 10.25	$ 3,741.25	$ 13.00	$ 4,745.00
8.	Furnish and install 16 ft wide, single leaf, chain link vehicle gate	3	ea.	460.00	1,380.00	862.33	2,586.99	333.00	999.00
9.	Supply and install liner and regrade temporary services area as detailed on Sheets 3 and 4	1	L.S.	12,587.00	12,587.00	21,228.00	21,228.00	7,964.00	7,964.00
10.	Remove and reset chain link fence	375	lin.ft.	2.75	1,023.00	4.04	1,502.88	11.00	4,092.00
SECTION F - WASTE HANDLING AND DISPOSAL									
1.	Disposal of Water Reactive Wastes, Solid	2	Drum	185.72	371.44	277.00	554.00	1,036.00	2,072.00
2.	Disposal of Water Reactive Wastes, Liquid	100	gal.	4.85	485.00	5.48	548.00	14.47	1,447.00
3.	Disposal of Strong Reducer, Solid	2	Drum	166.68	333.36	167.00	334.00	187.00	374.00
4.	Disposal of Strong Oxidizer, Solid	2	Drum	166.68	333.36	167.00	334.00	187.00	374.00
5.	Disposal of Strong Ozidizer, Liquid	100	gal.	3.20	320.00	5.48	548.00	4.01	401.00
6.	Disposal of Organic Liquids, Low Halogen Concentration, (< 2% Halides), <50 ppm PCB	2,970	gal.	2.30	6,831.00	3.00	8,910.00	3.80	11,286.00
7.	Disposal of Organic Liquids, High Halogen Concentration, (> 2% Halides), <50 ppm PCB	700	gal.	2.90	2,030.00	4.26	2,982.00	5.97	4,179.00
8.	Disposal of Aqueous Acids, pH <2.0	7,205	gal.	1.75	12,608.75	2.65	19,093.25	2.20	15,851.00
9.	Disposal of Alkalines, pH >12.5	2,255	gal.	1.61	3,630.55	2.14	4,825.70	2.44	5,502.20
10.	Disposal of Aqueous Base Contaminated with Cyanide	150	gal.	2.67	400.50	5.13	769.50	3.97	595.50
11.	Disposal of Aqueous Base Contaminated with Sulfide	150	gal.	2.67	400.50	5.32	798.00	3.97	595.50
12.	Disposal of Drummed Solids, >50 ppm PCB	50	Drum	134.89	6,744.50	120.77	6,038.50	180.40	9,020.00
13.	Disposal of Drummed Solids, PCB <50 ppm	567	Drum	95.62	54,216.54	117.10	66,395.70	138.54	78,552.18
14.	Disposal of Bulk Solids, PCB <50 ppm	440	ton	81.73	35,961.20	81.37	35,802.80	81.00	35,640.00
15.	Disposal of Liquids, 50 ppm <PCB <500 ppm	250	gal.	9.10	2,275.00	5.41	1,352.50	5.97	1,492.50
16.	Disposal of Liquids, PCB >500 ppm	100	gal.	6.94	694.00	6.38	638.00	5.97	597.00
17.	Disposal of Explosive Wastes	100	lb.	13.56	1,356.00	77.26	7,726.00	30.00	3,000.00
17A.	Disposal of Shock Sensitive Wastes	200	lb.	7.78	1,556.00	15.83	3,166.00	10.00	2,000.00

Item	Description	Estimated Quantity	Unit	Defender Vactor Systems Inc. Rt. 1 Box 100 Eastover, SC 29044 Unit Price Numerical	Defender Vactor Systems Inc. Rt. 1 Box 100 Eastover, SC 29044 Total Price Numerical	CECOS International 2321 Kenmore Road Buffalo, NY 14207 Unit Price Numerical	CECOS International 2321 Kenmore Road Buffalo, NY 14207 Total Price Numerical	OH Materials Co. Box 551 Findlay, OH 45840 Unit Price Numerical	OH Materials Co. Box 551 Findlay, OH 45840 Total Price Numerical
SECTION F - WASTE HANDLING AND DISPOSAL (Cont.)									
18.	Disposal of Lab Packs	796	Drum	$ 127.28	$101,314.88	$ 191.38	$152,338.48	$ 247.00	$196,612.00
19.	Disposal of Empty Drums	1,339	Drum	7.59	10,163.01	13.74	18,397.86	11.43	15,304.77
20.	Disposal of Base Neutral Aqueous, including decontamination and wash waters, <50 ppm PCB, No Cyanide, No Sulfide	39,700	gal.	0.56	22,232.00	0.59	23,423.00	0.72	28,584.00
21.	Disposal of Pesticides/ Herbicides, Liquid	100	gal.	2.21	221.00	3.79	379.00	3.52	352.00
22.	Disposal of Pesticides/ Herbicides, Solid	2	Drum	125.75	251.50	189.50	379.00	189.00	378.00
23.	Collection and Handling of Sludges	100	Drum	68.03	6,803.00	30.92	3,092.00	75,000	7,500.00
SECTION G - PROJECT CLOSEOUT									
1.	Project Closeout	1	L.S.	12,217.08	12,217.08	12,124.00	12,124.00	14,591.85	14,591.85

BID SUMMARY

SECTION		Defender Vactor Systems Inc. Rt. 1 Box 100 Eastover, SC 29044	CECOS International 2321 Kenmore Road Buffalo, NY 14207	OH Materials Co. Box 551 Findlay, OH 45840	Triangle Resource Industries P.O. Box 370 Laurel, MD 20707
A.	PROJECT START-UP	$ 32.807.45	$ 55,308.15	$ 32,378.00	$ 34,964.60
B.	TEMPORARY	41,300.00	31,457.00	30,600.00	46,701.50
C.	SITE SERVICES	54,762.50	66,878.60	78,610.00	107,289.00
D.	MATERIALS	27,338.50	34,414.40	35,227.50	34,183.25
E.	SITE PREPARATION	79,261.76	69,162.24	62,526.00	65,078.50
F.	WASTE HANDLING & DISPOSAL	271,533.09	358,825.29	421,709.65	381,956.46
G.	PROJECT CLOSEOUT	12,217.08	12,124.00	14,591.85	15,940.15
TOTAL CONTRACT PRICE		$519,220.38	$628,169.68	$675,643.00	$686,113.46

SECTION		D'Appolina Waste Isolation Inc. 10 Duff Road Pittsburgh, PA 15235	SCA Services Inc. 5 Middlesex Avenue Somerville, MA 02145	Harbert International One Riverchase Parkway South Birmingham, AL 35201	Chemical Waste Management 2110 Newmarket Parkway Marietta, GA 30067
A.	PROJECT START-UP	$ 87,406.00	$ 52,662.00	$103,375.00	$ 56,072.50
B.	TEMPORARY	137,836.00	91,046.00	33,000.00	67,550.00
C.	SITE SERVICES	52,716.20	75,780.00	109,000.00	135,505.00
D.	MATERIALS	38,342.60	42,034.00	68,695.00	39,500.00
E.	SITE PREPARATION	59,698.59	85,856.35	175,118.00	53,000.00
F.	WASTE HANDLING & DISPOSAL	484,453.35	542,453.44	501,473.00	677,816.22
G.	PROJECT CLOSEOUT	12,183.00	13,000.00	7,400.00	20,000.00
TOTAL CONTRACT PRICE		$872,179.00	$902,831.79	$998,061.00	$1,049,443.72

A brief description of the key construction events is presented on a week by week basis to give an overview of the construction management and resident services.

- Week 1 - On February 15, 1983 a preconstruction conference was held between representatives of Defender Vactor Systems and DHEC. At the conclusion of this conference DHEC issued Defender Vactor Systems the Notice-to-Proceed.

- Week 2 - On February 16th, Defender Vactor Systems assumed responsibility for site security from the State and on February 18th submitted their health and safety and contingency plans for the execution of the work. After an immediate review by DHEC, Defender resubmitted these plans on February 22nd.

- Week 3 & 4 - On March 3, 1983 site preparation activities were initiated with the placement of the polyliner working mat. On March 7th the contractual 90 day time for completion started and the following day the first trailer was installed on site.

- Week 5 - On March 14th the Safety Officer and Custodian were officially on-site and three days later a drum fire occurred.

At this point in the project, DHEC contacted USEPA and CDM and arranged for CDM to provide on-site technical assistance to support the DHEC field staff. The reason given by DHEC was that Defender Vactor Systems was critically behind schedule and not executing the project in an organized manner. On Monday, March 22, 1983 CDM provided on-site technical support staff to assist DHEC. CDM assigned Mr. W. Engler of Conestoga-Rovers & Associates, our subconsultants, to be the CDM team site representative. Mr. Engler was available for this immediate assignment, had experience in the field execution of remedial cleanups and had knowledge of the site and the work to be accomplished since he had assisted in the contract documents development.

- Weeks 6 & 7 - On March 28th Watt Construction initiated construction of the site access roadway and Defender Vactor Systems is authorized to change the roadway material from granular material to common fill to expedite the construction.

- Week 8 - On April 4th the line pit was encountered and during the remainder of the week Defender Vactor Systems attempted to cross the line pit with poor success.

- Week 9 - On April 11th the payment for the construction of the roadway was modified to a time and materials basis with concurrance by Defender Vactor Systems.

- Week 10 - The site access roadway was completed on April 19th. Defender Vactor Systems submitted their drum handling protocol to DHEC for approval on April 21st.

- Week 11 - On April 29th Mr. D. Shivley, Project Manager for Defender Vactor Systems, moved a lab pack without proper safety equipment and a container exploded. DHEC issued Defender Vactor Systems its first notice (oral) of poor performance.

- Week 12 - Defender Vactor Systems completed the construction of the Remote Opening and Detonation areas. On May 3rd lab pack processing started and Defender Vactor Systems stated that 75 percent of the containers in the lab packs were unknowns.

- Week 13 - The drum crusher was finally delivered on-site on May 10th. On May 11th the first detonation of shock sensitive waste was performed after a one day postponement due to action by Grass Roots Organization Workshop (GROW) citizens action group.

- Week 14 - On May 18th the drum crusher was operational and the crushing of over 200 drums previously stockpiled started.

- Week 15 - On May 25th Defender Vactor Systems submitted its first critical path schedule update for the completion of the work.

- Week 16 - DHEC agreed on May 31st to extend the working day from eight (8) hours to ten (10) hours to expedite the remedial cleanup. DHEC staff, on an eight hour work day, had to adjust personnel schedules to accommodate Defender Vactor Systems. Mr. D. Shivley, Project Manager for Defender Vactor Systems, committed his second major health and safety infraction by removing the respiratory protection from employee in dirty zone on May 31st. Shivley was replaced on project by Mr. J. Linsey on June 2nd. On June 3rd Defender Vactor Systems was issued second notice of poor performance (written).

- Week 17 - On June 8th the time for completion of the contract, 90 days plus two rain days, was reached and Defender Vactor Systems was in a liquidated damages position. On June 9th the steel vessel encountered on site was x-rayed.

- Weeks 18, 19 & 20 - Waste continued to be processed. Discrepancies determined between Alert Analytical Laboratories drum count and that of Defender Vactor Systems.

- Week 21 - The final 68 lab packs were processed. On July 1st Defender Vactor Systems submitted their intention to file a petition for change orders.

- Weeks 22 & 23 - On July 8th Defender Vactor Systems submitted their request for extra cost associated with cylinders found on-site. On July 13th all remaining waste was transported off

site and on July 14th the final waste detonation was conducted. Final project closeout started on July 15th.

On July 26th a final site inspection was conducted and the remedial site cleanup was officially completed.

Although there was variation in the individual waste category line items, the final base quantities of waste estimated to be on-site did not vary significantly from the actual quantities encountered.

- The total number of drums estimated to be on-site was 2,154, the actual number found was 2,121.

- The total pounds of shock sensitive and explosive wastes estimated was 300 pounds, the actual amount encountered was 560 pounds.

- The total gallons of waste liquids estimated to be on-site was 14,080 gallons, the actual gallonage encountered was 12,028.

- The total number of lab packs allowed to be left on site from the previous cleanup accomplished by TRI was 500. The total number estimated was 796 and the total number of lab packs found was 807.

SECTION 3: RESPONSE TO REQUEST FOR CHANGE ORDERS

3.1 INTRODUCTION

CDM has performed a detailed review of Defender Vactor Systems request for change orders submitted on August 29, 1983. Our response to this request is presented herein and addresses in detail, each change order request. This response is based upon:

- Our involvement in the development of the contract documents and our on-site assistance furnished during the execution of the remedial cleanup
- Our participation in the Administrative Hearing conducted by the South Carolina Division of General Services in December 1983 and January 1984.
- The request by USEPA for CDM to prepare a formal response to this request for change orders.

3.1.1 Contract Provisions

The agreement entered into by the contractor for the Bluff Road project provides numerous provisions that are designed to protect both the contractor and the owner. In order for this agreement to be effective in its execution both parties are required to operate within these agreed to provisions. The contractor was, under Article 4, required to notify the owner and engineer in writing of any subsurface or latent physical conditions at the site which differed materially from those indicated in the Contract Documents. The contractor was obligated under Article 10 to state in writing what constitutes additional cost and extension of time. Article 11 requires that an increase in the contract price shall be based upon written notice delivered by the contractor to the owner and engineer within fifteen days of the occurrence of the event giving rise to the claim. Also the contractor was required to notify the owner and engineer

of delays in writing within ten days after the beginning of such delay. Defender Vactor Systems did not comply with these provisions of the agreement.

3.1.2 Project Operations

Defender Vactor Systems consistently references the lack of space as a basis for his claim although this factor was stressed in the two pre-bid conferences, both of which his staff attended. There were two compounding elements which reduced the available space and both were directly attributable to the contractor's operation and management of the site.

First, the contractor set both the clean/dirty zone fenceline and constructed the decontamination pad sixteen (16) feet too far into the site, reducing the critical dirty zone work area by over 2000 sq ft. This mistake impacted additionally on-site vehicle movement. Figure 3-1 illustrates the standard design turning radius for truck traffic, which requires a 44-foot turning radius. However, as shown on Figure 3-2, the placement of the decontamination pad sixteen (16) feet into the site changed the pivot point of the designed turning radius, making it impossible for a truck to make this turn efficiently. The attached photograph indicates the location of the front row of drums in Area "A" causing this turning restriction.

The contractor compounded the problem by not following the intent of the contract documents which specified these drums to be moved to the initial staging area. Figure 3-3 provides an inset from Drawing No. 3. As indicated, the building platforms were intended to be used as the initial staging area for the Area "A" drums. This would have provided for more working space in this critical front area. However, the contractor started moving drums from the middle of the site, filling this initial staging area and leaving Area "A" intact. This area remained filled with drums throughout the execution of the project.

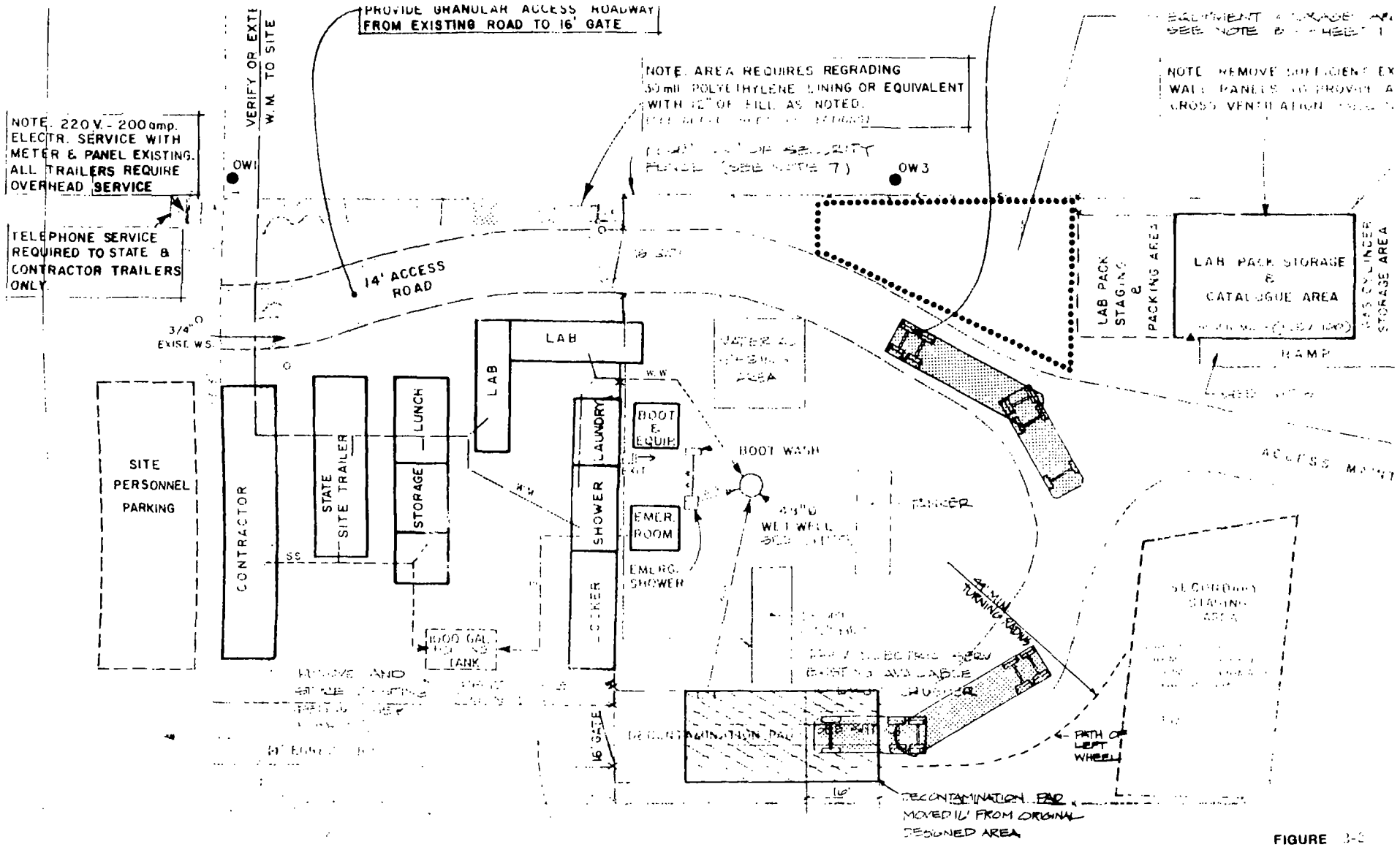


FIGURE 3-3

BLUFF ROAD SITE
Columbia, South Carolina
SITE AS BUILT

SOURCE: C-50 Design Vehicle Acetate based on AASHO, A Policy on Geometric Design of Rural Highways, 1965

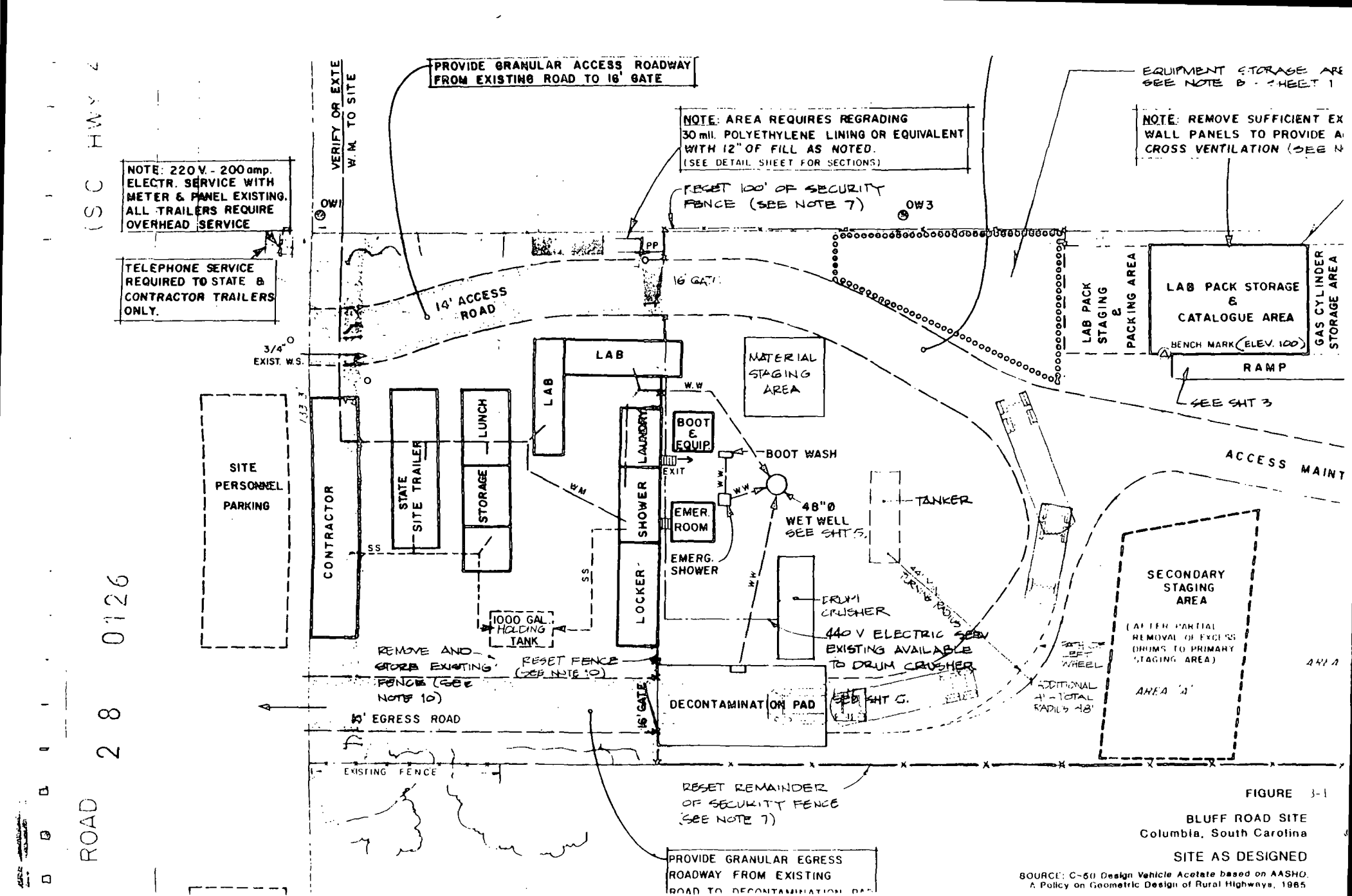


FIGURE 3-1

BLUFF ROAD SITE
Columbia, South Carolina

SITE AS DESIGNED

SOURCE: C-50 Design Vehicle Acetate based on AASHO. A Policy on Geometric Design of Rural Highways, 1965

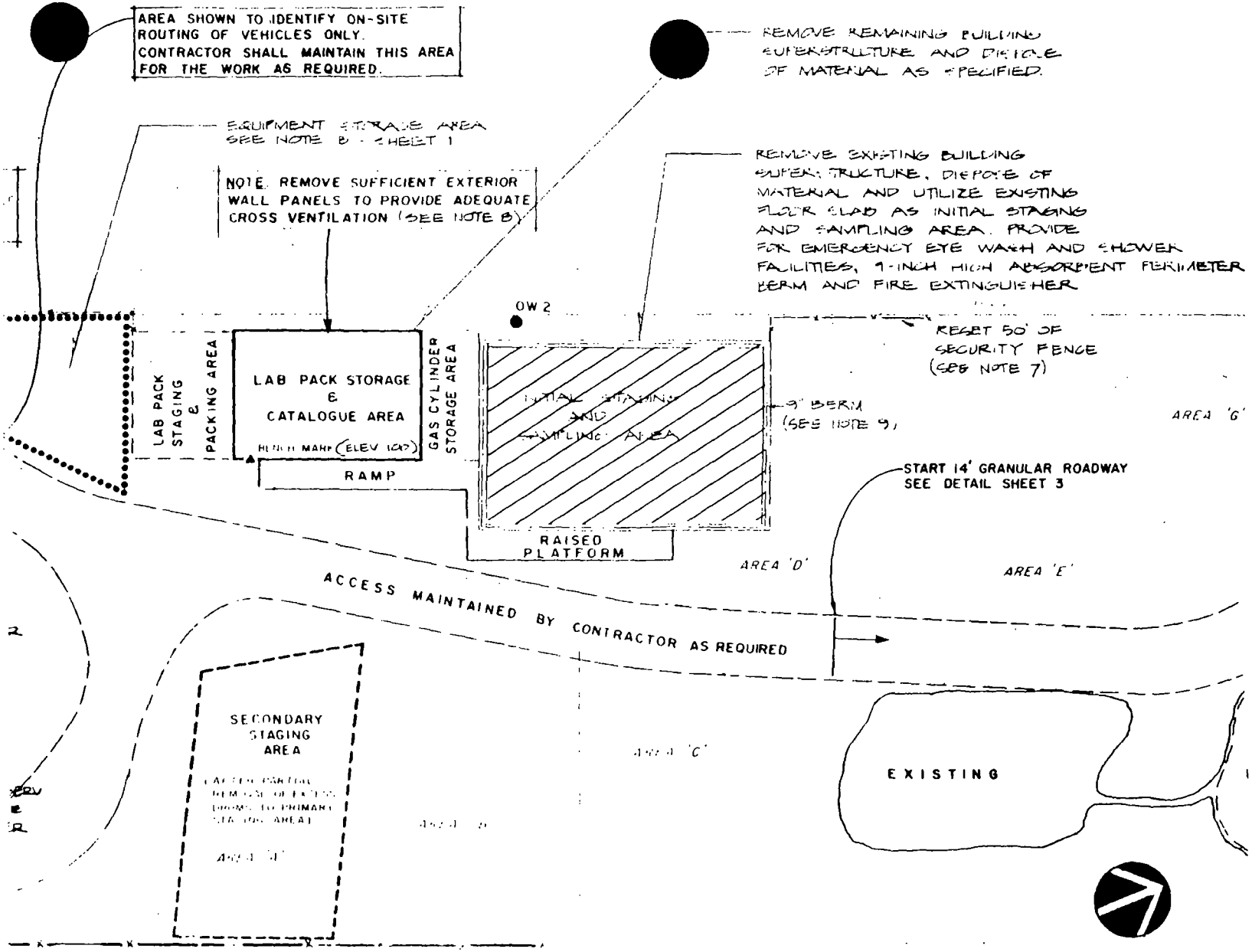


FIGURE 3.3

BLUFF ROAD SITE
COLUMBIA SOUTH CAROLINA

INITIAL STAGING AREAS

CDM

April 1983 photograph showing the location of the decontamination facility in relationship to the stacked drums. The decontamination facility was constructed in the wrong location, 16 feet into the site, which as stated restricted maneuverability and furtner constrained the site operations.

The drums started to be moved on April 29, 1983, and as late as May 10 and 12, 1983 suggestions were made to the contractor to follow the specifications and process the drums in Area "A".

Excerpts from our Site Meeting notes of May 10, 1983:

> "11. A small discussion ensued on the sequence of unstaging drums and in the opinion of the State, it would behouve the contractor to work from front to back to give room for additional unstaging and allow for adequate equipment and truck turning onto the de-con pad."

and our Site Meeting notes of May 12, 1983:

> "3. Discussed that extra drum movement is required and that the staging should happen front to back. Drums should also be handled as little as possible."

The following text summarizes in detail the response to "Request for Change Orders."

3.2 DETAILED RESPONSE TO CHANGE ORDERS

3.2.1 CHANGE ORDER REQUEST NO. 1

ITEM F-18: Disposal of Lab Packs

Contractor's Request - Defender Vactor Systems Inc. stated that their bid for the disposal of lab packs was based on an estimated average of 68 containers per lab pack and an average estimated for unknowns of 17.5% per lab pack. The actual conditions encountered during the processing of the lab packs resulted in an actual average of 148 containers per lab pack, with an average percentage of unknowns of 98.6%.

Defender also states there were delays in processing the lab packs due to the problems encountered in constructing the roadway to the remote opening area to the rear of the site. Another problem cited was associated with the use of the remote opening procedure which was..."an untried and unproven procedure with no background, history or supporting data for estimating time."

The number of lab packs estimated to be on site was 796; the number found as determined by Defender was 861.

The amount of the change order requested by Defender under Item F-18 is $148,529.06

Response to Request - Although it is virtually impossible to accurately predict the number and condition of the containers in lab packs, the Contractor can make a reasonable estimate of the total amount of material by knowing the number of drums and the volume they can hold, 55 gallons. The Appendix of the Contract Documents prepared for the SCR&D Bluff Road site contain a copy of the U.S. Environmental Protection Agency Lab Pack Disposal Procedure, where it states that..."one lab pack can contain from 1 to 300 individual containers". Using this for guidance, an average of 150 containers per lab pack is close to the actual average of 148 containers per lab pack which Defender stated they found on-site.

Concerning the amount of unknowns to be expected in the lab packs, there was no estimate presented in the specifications. However, the Contract Documents in Section 13579 Sorting, Identification, Packing and Disposal of Packaged Laboratory Chemical Wastes (Lab Packs) on page 13579-1 did state that:

"1.02 DEFINITION

A. For purposes of this work, Laboratory Chemical Waste Containers (lab packs) will include the following:

1. Large containers, usually 55 gallon open head drums, filled with numerous small volume containers of chemicals and other miscellaneous laboratory wastes unsegregated with respect to compatability. Vessels may or may not be packed in absorbent material and probably will not have a packing slip or manifest."

In addition, at the September 29, 1982 pre-bid conference attended by Mr. Larson and Mr. Shively from Defender, Mr. Jim Noles of Triangle Resource Industries (TRI) (on-site manager for the previous generators cleanup of the Bluff Road site) stated that, "I would like to point out that if you have 42 lab packs a day and I want to emphasize this, and most of those contain unknown materials, that is a heck of a lot of material."

A facility and procedure was researched, specified and designed specifically to remotely open unknown lab pack material. Defender bid $12,912.20 to construct this facility. This certainly should have given the indication that unknown material in lab packs was to be a significant portion of the work.

As shown below, it was more costly for the Contractor to process and dispose of knowns than unknowns, and in fact it was to the Contractors distinct advantage to have more unknown containers in the lab packs based upon the procedures specified and the methods of payment.

Lab Pack Procedure: The procedure specifies that when a lab pack was identified on-site it would be recorded for payment as a lab pack. The containers within the lab pack would be removed and sorted into knowns and unknowns, each with a specific handling requirement.

A. For known containers/materials:

1. The known materials, that are to be repackaged, must be identified and sorted into five compatability categories, by a chemist, * based upon the following:

   1) Inorganic acids and salts of inorganic acids.
   2) Inorganic alkalies, organic bases and salts of inorganic alkalies.
   3) Solid organic compounds (excluding organic acids and bases).
   4) Organic liquids (non-ignitable, 40 CFR 261.21) including organic acids but excluding organic bases. Peroxide forming materials shall be stabilized prior to packing.
   5) Solid pesticides, insecticides, fungicides.

2. The knowns would then be repacked by compatibility categories one at a time, in a repack drum filled with enough absorbent material to absorb all the liquid in the known containers.

3. A manifest would be prepared identifying each container in terms of the quantity and type of materials repacked.

4. The repack drum with the manifest would be labeled and transported to a permitted disposal.

B. For unknown containers/materials:

1. The unknown materials would be segregated into liquids and solids and transported to the remote opening area.

2. The unknown containers would be remotely opened using 22 caliber rifle fire in quantities of solid or liquid quantities not to

* In South Carolina, a qualified chemist can declare unmarked materials based upon his observation of that material. The chemist on the Bluff Road site during this cleanup was a subcontractor of Defender.

exceed one gallon. (As the work progessed, the Contractor was allowed to use a remotely operated steel plate to crush the smaller containers to expedite the work.)

3. The contents of the remotely opened containers were collected in absorbent material and disposed of as bulk solids.

Lab Pack Pricing: An evaluation of the payment differential for the processing of knowns and unknowns indicates that the cost associated with the disposal of knowns exceeds the cost of disposing unknowns.

A. For known containers/materials

1. Lab packs were a unit price, one-time payment which covers handling, transport and disposal. Therefore, if all of the contents were knowns it would be practical to assume that one lab pack found on-site could yield two or more repacked lab packs. This is because of the requirement that the lab packing material equal approximately three (3) times the liquid volume of the contents. This would require that the cost for disposal of all "produced" lab packs be covered under the original unit price.

2. The associated costs are the Contractor's personnel time (chemist) required to identify the containers, sorting into the five compatability categories, determining the volume of material in each container, preparing the manifest, repacking the containers one at a time, furnishing and placing the absorbent material, purchasing the repack drum, transporting the repacked lab packs to a permitted disposal facility and paying the disposal cost.

B. For unknown containers/materials

1. Lab packs with a majority of unknowns are paid the same unit price as above for handling, (with little or no repack lab pack disposal cost) followed by an additional payment for the disposal

of the bulk solid material "produced" during the remote opening period. These bulk solids result from the contaminated absorbant (supplied and paid for under Force Account No. 2) taking up the liquids (again at approximately three (3) times the volume).

2. The associated costs are the Contractors personnel time required to sort the containers into liquids, solids, transport to the remote opening area, remotely open several bottles per round of firing with an accumulated volume of one gallon, furnishing and collecting the abosrbent material, sampling and analyzing the absorbent material for disposal (which should have been a shared cost since this material was included with other site generated bulk solid waste) transporting the bulk solids to a permitted disposal facility and paying the disposal cost.

Drum logs kept by Defender's subcontractor Alert laboratory indicate that 807 lab packs were identified on-site, an increase of less than 1.4% over our estimate of 796 lab packs.

We also do not agree with the tone of Defender's claim that the remote opening procedure was "an untried, unproven procedure with no background, history or supporting data for estimating time." It is a fact that the procedure was a draft and was implemented for the first time at Bluff Road. Based upon the description provided, a contactor should have been able to reasonably estimate the time and cost involved. As presented below, it did in USEPA's opinion address personal safety in this inherently hazardous activity and was technically simplistic, efficient and extremely economical.

A portion of the description which was included in the Contract Document is included with emphasis added:

" U.S. ENVIRONMENTAL PROTECTION AGENCY
LAB PACK DISPOSAL PROCEDURE

PROBLEM

Lab packs are 55 gallon drums which contain numerous small volume containers of chemicals. Most are laboratory reagents which have been disposed of for a

variety of reasons, some being: reagents no longer used by the lab; too old to meet lab grade specs; off spec material; quality control product samples; cleaning out defunct labs etc.; improper disposal of this type container (lab pack) present a unique and hazardous clean-up problem. If a manifest or inventory of the individual components of a lab pack is not available, the containers must be opened and the contents removed and sorted manually. If the individual containers are not identified, they must be sampled for categorization and proper disposal. This situation is complicated by the probability of shock sensitive explosive materials beng present such as picric acid or peroxides. Both of these materials can be detonated, in some cases, by simply opening the container in which they are stored. Therefore, the sampling procedure becomes hazardous when dealing with unknown lab pack components due to the possibility of an explosion when opening containers to draw samples.

Unfortunately, a non-invasive technique does not exist for identifying either picric or peroxides (or similar materials) in unmarked containers. Therefore, any procedure for dealing with unknown lab pack components must be assumed to be the worst case, i.e., every container contains a shock sensitive material unless evidence exists to the contrary.

As a result of the above mentioned factors, it is unacceptably hazardous to put a worker in the position of opening unknown lab pack components manually, as he might suffer injury or death as a result of an explosion. Considering that no personnel protective gear exists that would adequately protect a person from this type of hazard, remote method must be used to open the subject containers.

Mechanical or remote opening devices could be designed for this application, but anything short of a highly complex device that would open various sized containers with different type closures, automatically or sequentially, would require a set-up procedure for each container. Few projects have enough containers to justify an assembly (or more appropriately, disassembly) line type system, and seldom is a project so small (one lab pack can contain from 1 to 300 individual containers) as to make a signle set-up procedure feasible.

OBJECTIVE

This procedure describes a mechanism for remotely opening and stabilizing unknown lab pack components safety and with sufficient efficiency to be operationally feasible in almost all cases. The concept utilizes a high velocity, low mass projectile (a .22 cal. bullet) to remotely open containers. This safely accomplishes two things: the container (almost exclusively glass bottles) are opened by fracture from the bullet impact, and the contents are collected and rendered stable and manipulatable in a sorbent media (sand). Other mechanisms could be employed to open containers by impact (i.e., detonation, impact chute, impact pendulum, etc.) but rifle fire is superior for the following reasons:

1. Simplicity of Remote Operation: No remote wiring activation lines, motors, chutes, etc. are required between the impact site and the control site.

2. Minimal Projectile Potential: Since no equipment is required at the

impact site, the only mass present are the containers and the bullet. If a detonation occurs, only shrapnel from the container is involved, in most cases glass or possibly thin metal, neither of which have sufficient mass to become dangerous projectiles. The bullet will have passed through the container into a berm before the detonation can propagate and therefore, will not be a factor. Any procedure which involves equipment of any sort at the impact site will increase the potential for generating dangerous projectiles.

3. Minimize Detonation: The objective of the procedure is not to use detonation as a disposal technique, but to shock test, and possibly detonate only those materials which are shock sensitive. Batch detonations, when utilized as a disposal technique, in many cases simply disperse non-explosive , non-flammable components as hazardous materials, thereby rendering them unavailable for disposal, but are still present on-site.

4. Minimal Set-up: Containers must simply be placed in firing position, this can be done with many containers for each "set". This minimizes personnel contact at the impact site and increases operational efficiency.

5. Lo-Tech Procedure: Procedure involves no moving parts, no electronics, nothing mechanical at the impact site. This eliminates "down time" due to equipment failure. No power, hydraulics, pneumatics or other energy source, i.e. fewer problems.

6. Low Visibility: Very low key, quiet and non-disruptive procedure when compared with detonation, etc.

7. Low Cost: Extremely economical as opposed to alternative techniques which can involve expensive equipment, and expensive personnel."

Therefore, the Contractors request for a Change Order in the amount of $148,529.06 is not warranted since the high percentage of unknowns simplified procedures and reduced costs. In addition, Defender's estimate of 68 containers per lab pack is not consistent with the readily available information given in the Contract Documents.

3.2.2 CHANGE ORDER REQUEST NO. 2

ITEM C-5: Personal Safety Equipment and Protective Clothing

Contractor's Request - Defender is requesting additional payment under Item C-5 because Defender had to provide personal safety equipment and protective clothing for 66 on-site personnel during the Bluff Road project. This was based upon an increase in the work due to the following reasons:

1. additional work properly managing the lab packs
2. associated with properly disposing of shock sensitive wastes
3. the additional work required in the staging and restaging of drums to obtain room within which to work
4. the difficulties encountered in constructing the road to the remote opening area
5. the unusual amount of rain
6. the frequent requests by site representatives and consultants for additional and varied equipment and clothing, and
7. the additional time required to complete the contract.

The amount of the Change Order requested by Defender under Item C-5 is $70,252.24.

Response to Request - Based on our analysis of the site staffing requirements, and for site and cost control reasons, we established a contractual limit of 20 contractor site personnel for measurement and payment purposes.

The Contract Documents under Measurement and Payment on Page 01150-4 are quite specific:

> "Payment will be made for up to 20 Contractor's personnel. Clothing and equipment for additional Contractor's personnel will be at his own expense. Payment for Owner's personnel will be made on an as required basis as authorized by the RPR."

In reviewing the request presented by Defender, no basis for recommending a change in the number of personnel safety equipment and protective clothing units allowed under the contract was established. In fact, our records and

Defender's submitted information indicates that 58 personnel were provided equipment and clothing as shown on Table 3-2-1.

The information provided by Defender in their "Net Average Hourly Rate Derivation" provides some interesting results.

- Utilizing the "Net Hour" category which does not include personnel provided for under Items C-1, C-2 and C-3 a total of 4,969 hours were spent against the job for the 12 weeks from the start of the work on February 15, to May 6, 1983. Calculation:

$$\frac{\text{4969 Total Hours}}{\text{12 weeks}} = \text{414 Total hours per week}$$

$$\frac{\text{414 hours/week}}{\text{40 hour week per person}} = \text{10 people per week}$$

(Note: Contract restricted work periods to 8 hour days. Therefore, for the first half of the project the Contractor averaged an equivalent of only 10 on-site personnel.)

- Utilizing the same data for the next 12 weeks to the end of the project from May 13 to July 26, 1983 a total of 14,353 hours were expended.
Calculation:

$$\frac{\text{14,353 Total Hours}}{\text{12 weeks}} = \text{1196.1 Total hours per week}$$

$$\frac{\text{1196 hours/week}}{\text{40 hour week person}} = \text{29.9 people per week}$$

(Note: By June 1, 1983 Defender had moved up to 10 hour days which could reduce personnel to an average of 24.)

The basic data shows that for the first half of the project the Contractor

TABLE 3-2-1

ANALYSIS OF PERSONAL SAFETY EQUIPMENT AND

PROTECTIVE CLOTHING REQUIREMENTS

SCR&D BLUFF ROAD SITE, SOUTH CAROLINA

COLUMN A		COLUMN B	
CONTRACTOR'S BASIS		RECOMMENDED ALLOWABLE	
Category	No.	Category	No.
Project Managers	2	Site Management	
Asst. Project Manager	1	Project Manager	1
Project Coordinator	1	Safety Officer	1
		Project Foreman	1
Safety Officer	1	Lab Pack	
Chemist	2	Chemist	1
Equipment Operators	4	Lab Packers/Unpackers	3
Project Foreman	1	Rovers	2
		Remote Opening	
Air Monitors	2	Firers	1
Medical Technician	3	Set-up Men	2
Cascade Operator	2	Equipment Operators	
Explosive Expert	1	Grappler	1
Staging & BUlking	4	Backhoe	2
		Drum Crushing/Decontamination	1
Drum Crush	1	Other	
Sub-contractor	5	Samplers/Consolidation	3
Sampling	4	Air Monitors/EMT's	2
Lab Packing	11	Cascade Operator	1
Remote Opening	6	Explosives Expert	1
Total Contractor Personnel	51	Total Contractor Personnel	23
Owners Personnel	7	Owners Personnel	7
TOTAL	58	TOTAL	30

supplied an equivalent average of 10 people. For the second half of the project, an equivalent average of 30 people were supplied. This shows, based on total hours supplied by Defender, that on the average an equivalent of 20 Contractor's personnel were assigned to the on-site project execution.

This reinforces the Contract estimate of 20 Contractor personnel required to be furnished personal safety equipment and protective clothing.

However, based upon our understanding of how the site was operated, and what could be reasonably allowable, we can substantiate increasing the allowable number of contractor personnel units to 23 as also shown on Table 3-2-1.

Defenders development of an increase in unit cost results in a cost per person of $1,393.75 (based on 66 people). No data has been provided to justify an increase in their unit price bid of $805.00 per person.

3.2.3 CHANGE ORDER REQUEST NO. 3

ITEM F-13: Disposal of Drummed Solids

Contractor's Request - This Change Order, requesting that the drummed solids be paid under Line Item F-13 (not F-14 as has been indicated as allowable), is based on the claim that the waste was drummed solids and not bulk solids. The actual number of drummed solids encountered was 271. Additionally, Defender is requesting a change in the contract price to accommodate an increase in work, based on the following:

- "An unexpected number of badly deteriorated drums of solids were also discovered. This required an unexpected amount of overpacking which increased the time and materials necessary to properly manage the drums."

- "The Work associated with the management and disposal of drummed solids increased because of the many times the drums had to be staged and restaged because of the lack of adequate space on the site and because of the unforeseen analytical analyses which were required."

The amount of the Change Order requested by Defender under Item F-13 is $44,009.94.

Response to Request - This item was paid under item F-14, Bulk Solids, because they were handled and disposed of as bulk solids. As a part of Defenders presentation the following statement was made:

> "The drum was then crushed by the grappler to reduce its size to the volume of the solids which remained in the drum. The drum was then deposited in the dumpster."

First, the efficiency of crushing the drums by the grappler is greatly improved if the drums are deteriorated, as normally expected on an abandoned hazardous waste site and in fact during both pre-bid conferences attended by Defender personnel, continual reference was made to the deteriorated state of

the drums. Additionally, a deteriorated drum of solids that was crushed and disposed of in a dumpster would not be placed in a D.O.T. approved overpack unless this method was used by Defender to transport drums on-site. Defender followed the above statement with:

> "When a dumpster was full of drums and unconsolidated solids, five composite samples were taken and shipped off-site for a complete gas chromatograph/mass spectrometer analysis."

Based on Defenders recollection of the disposal practice there was no need to restage these drummed solids because only drums that are to be sampled for compatibility analysis for bulking need to be restaged (if liquids). Furthermore, the five composite samples of the "drums and unconsolidated solids" would mean that less analysis was required than if each drum was sampled as an individual container.

Finally, it is our understanding that some of the bulk solids loads shipped to the Pinewood facility included drums that had been billed for disposal as individual drums (which are at a higher cost). However, since that time this accounting error has been corrected, and all 271 drums were not sampled, shipped or disposed of as individual drums, but as bulk material.

3.2.4 CHANGE ORDER REQUEST NO. 4

ITEM F-14: Disposal of Bulk Solids

Contractor's Request - Defender is stating that the costs associated with managing and disposing of that large, miscellaneous category of waste were greater than the Contract unit price because of changes in the Work. These are as follows:

- "First, the only available road was often congested and in fact closed to traffic because of equipment and temporarily staged drums."
- "Instead, waste and debris from the remote opening operation would be put in a drum, hauled on a front-end loader to the front of the site (which was often delayed as noted above) and emptied into the dumpster."
- "The surprising number of trees that had to be cut down and managed as bulk solids is also a change in the Work."
- "While not meant to be critical of state officials, since they were undoubtedly involved in other important matters, shipments of bulk solids off-site were often delayed while waiting for approval by those officials."

The amount of the Change Order requested by Defender under Item F-14 is $54,069.19.

Response to Request - Each point that was presented by Defender is discussed as follows:

First, the roadway was never blocked because of "temporarily staged drums." This roadway was the site firelane and emergency escape route, and blockage of this route would be a serious violation of the Health and Safety protocol.

Second, there were no restrictions from placing a small dumpster in the back

of the site and more specifically, the remote opening debris collection box constructed of 1" construction plywood with reinforced corners and lined on the outside was specifically designed to allow for a front end loader to scoop the absorbent directly out of the box. Additionally, suggestions made by members of DHEC and CDM during the May 11, 1983, Daily Site Meeting No. 1, as follows:

> "When the vermiculite is changed, it is being drummed. It would be faster to stage a small roll-off next to the area to allow the front end loader to scoop out contaminated vermiculite and bulk into the roll-off."

The method of drumming this debris for transport to the front of the site was developed and implemented solely by Defender.

Thirdly, the only trees that were cut down and disposed of as bulk solids were those that were used to construct the remote opening area. Those trees that were removed for the purposes of detonation clearing remain on-site.

Finally, regarding the delays of bulk solid shipping, the Contractor also stated that:

> "Another reason for the increase in the cost was that it often took as long as five days to obtain the analytical results on a dumpster of bulk solids."

The function of the on-site laboratory is the sole responsibility of the Contractor. The June 13, 1983 Daily site meeting notes also provide instances of delays.

> "Additional backhoe will be onsite tommorrow to transfer the 2 loads from the leaking roll-offs. 2 additional roll-offs will also be on site. The 2 roll-offs from BFI are still leaking and will not be allowed off-site and therefore will be transferred to other roll-offs.
>
> "It was noted that the roll-off from Welms was damaged today."

3.2.5 CHANGE ORDER REQUEST NO. 5

ITEM A-3: Medical Examinations

Contractor's Request - Defender is requesting additional payment under Item A-3 based upon increases in the work which required more time and more personnel to conduct the clean up. These increases in the work presented by Defender relate to:

1. the work associated with the lab pack disposal including lab pack staging, sorting, repackaging and remote opening
2. the disposal of more shock sensitive wastes
3. the construction of the road and site preparation which required almost five times the amount of fill than originally estimated and almost four times the amount of granular material than originally estimated due to the discovery of the lime pit within the roadway alignment
4. the excessive rainfall in March and April which occurred when the site preparation was being performed and delayed the project at least 22 days due to being hampered by the rain or having to redo work due to rain damage.

In addition, DHEC required that all personnel working on-site have physicals: "...even the secretary who never went beyond Defender's trailer at the front of the site."

Table 3-5-1 Column A, presents the physicals that were given by job category, as presented by Defender, for the personnel working on the site.

The amount of the change order requested by Defender under Item A-3 is $9,865.00.

Response to Request - The Contract Documents were prepared considering the staffing requirements necessary to perform the work, the restricted area of the site, and on the basis of providing cost control associated with the necessary medical examinations to determine the fitness of the contractor's

TABLE 3-5-1

ANALYSIS OF MEDICAL EXAMINATION REQUIREMENTS
SCR&D BLUFF ROAD SITE, SOUTH CAROLINA

COLUMN A CONTRACTOR'S BASIS		COLUMN B RECOMMENDED ALLOWABLE	
Category	No.	Category	No.
Project Managers	2	Site Management	
Asst. Project Manager	1	Project Manager	1
Project Coordinator	1	Safety Officer	1
Secretary	1	Foreman	1
Custodians	2	Custodian	1
		Security Officer	4
Security	5	Lab Pack	
Safety Officer	1	Chemists	1
Chemist	2	Lab Packers/unpackers	3
Equipment Operators	4	Rovers	2
Project Foreman	1	Remote Opening	
		Firers	1
Air Monitors	2	Set-up Men	2
Medical Technician	3	Equipment Operators	
Cascade Operator	2	Grappler	1
Explosive Expert	1	Backhoe	2
Staging and Bulking	4	Drum Crushing/Decontamination	1
		Other	
Drum Crush	1	Samplers/Consolidation	3
Sub-Contractor	5	Air Monitors/EMT's	2
Sampling	4	Cascade Operator	1
Lab Packing	11	Explosives Expert	1
Remote Opening	6		
Total Contractor's Personnel	59	Total Contractor's Personnel	28

Owner's personnel were allotted 15 medical examinations which were not required due to existing medicals being on file.

personnel to perform the work and to monitor health effects which could be attributable to being involved with the work.

Based upon site staffing requirements (not including management) a contractual limit of 20 contractor site personnel was developed (Table 3-5-1 Column B).

As previously presented in our analysis of Change Order Request No. 2 a review of Defender's provided information presented in their "Net Average Hourly Rate Derivation" indicates that the equivalent average staffing for the project from the start of work on February 18 to the completion of the work on July 26, 1983 an equivalent average of 20.1 Contractor personnel were on-site, excluding the secretary, the safety officer, the custodian and the security officers.

The Contract Documents under Section 1150 - Measurement and Payment are quite specific regarding medical examinations in that only 20 Contractor personnel shall be compensated with provisions for 15 Owners personnel for a total of 35, as follows:

> "A-3 Medical Examinations
>
> 1. Measurement for medical examinations will be made at the actual number of on-site personnel, not to exceed 35, who have received Baseline and Exit medical examinations in accordance with the approved medical surveillance protocol established in accordance with Section 01030 as determined by the Owner.
>
> 2. Payment for the quantity determined above will be made at the unit price per person bid in the Bid Form in Item A-3 which price and payment shall be full compensation for providing baseline and exit medical examinations in accordance with established protocol for up to 35 personnel. The Contractor shall include in these personnel 15 non-Contractor personnel. Medical examinations for Contractor personnel exceeding 20 will be at the Contractor's expense, unless otherwise approved by the Owner in writing. Interim medical examinations required because of on-site spills, accidents or other causes resulting from Contractor's operations shall be at the Contractor's expense."

DHEC's insistence that all site personnel have medical examinations was well-founded and consistent with the objective of being able to monitor health effects which could be attributed to involvement with the Bluff Road project. The June 2, 1983 site meeting notes address the following:

"It was noted that Marsha, the Contractor's secretary, was exposed to fumes from lab unpacking gloves which were in the Contractor's trailer awaiting transport for repairs and subsequently got eye irritation which required medical attention (SIC.) at the company doctor. The State required that a proper accident report be filed and submitted to the State for filing in Marsha's medical file. It was also noted that all backlogged accident reports be immediately submitted to the State."

Based upon this review an additional six (6) medical examinations are recommended under Item A-3 to compensate Defender for the specified personnel (safety officer, custodian and security officers) beyond those indicated as required for the on-site operations. This would result in a change order in the amount of $1,120.

Basis: 26 x $265 =	$6,890	Recommended
	5,770	Approved
	$ 1,120	Change Order Amount

3.2.6 CHANGE ORDER REQUEST NO. 6

ITEM E-9: Site Preparation for Temporary Services Location

Contractor's Request - Defender claims that there were changed conditions associated with site preparation that caused delays and increased costs. These are as follows:

- "In constructing the road, an unknown lime pit, over which the road had to be built, was discovered."

- "Upon inquiry by Defender's supervisor for a Change Order to compensate Defender for the increase in the Work in building the road, the consultant cavalierly proclaimed that this was a unit price contract and that in no event would the compensation to Defender ever exceed the total Contract Price of $519,586.13."

- "The consultant did agree to pay for the additional cost of the granular material (by a Force Account); however, that additional money was simply "transferred" (by other Force Accounts) from the profits which Defender would have realized in constructing the equipment for Items E-3 and E-5."

- "The additional labor in building the road is further illustrated by the quantities of common fill (1941.27 cubic yards) and granular material (3445.20 tons) that had to be used. This clearly shows the tremendous increase in the Work associated with building the road."

- "The delay encountered in building the road (a substantial part of which was caused by the consultant insisting on trying to build the road on filter fabric) impacted several other operations involved in the cleanup. For example, access could not be gained to the rear of the site and the construction of the remote opening and storage facility for unknowns was delayed. Additional manpower had to be used in building the road while other labor (although being paid for) was not being used. .... To emphasize the magnitude of the problem,

the site and road preparation started on March 29 and was completed on April 27. .... Due to the Work being increased as described, a Change Order to extend the time 22 workdays or 28 calendar days is also requested....."

The amount of the Change Order requested by Defender under Item E-9 is $14,775.50.

Response to Request - The chronology of events recorded in the site records do not substantiate these claims, and in addition, payment was made under Item D-1, Granular Material, which covered furnishing, hauling, placing, compacting, grading, maintaining and miscellaneous items. Specifically;

- It was noted in the Contract Documents in Section 01010 - Summary of Work that there was an impoundment area to the rear of the site that resembled an inactive waste neutralization pit. This area was also noted on the plans. The extent and consistency of the lime pit impacting on the road construction was not known until April 4, 1983 when the dozer became buried.

- The consultant did not make the statement that "in no event would the compensation to Defender ever exceed the total Contract Price of $519,586.13" since this is in direct conflict with the basis and application of a unit price contract.

- The "Force Accounts" were nothing more than an accounting procedure used to account for the cost of work conducted by the Contractor on a Cost of Work, Section 11.4 (Time and Materials) basis that was outside of the scope of the Contract. The costs were based upon actual costs plus an agreed to markup submitted by the Contractor, and agreed to by the Contractor, at the time the work was conducted. Additionally, monies are not "transferred" by a Force Account. Had there been lost profits, Defender should have produced the "Certified Bid Form" documenting his losses.

Item E-9 specifies payment for clean zone site preparation and existing site

road maintenance. The new granular roadway construction (dirty zone) marks (as specified on the Drawings) the end of Item E-9. Instead, roadway construction is paid for under Item D-1 as follows:

"D-1 Granular Material

1. Measurement for granular material will be made in tons measured by a State certified scale at the actual quantity, authorized by the RPR, and delivered to the site for incorporation in the work as documented by a source weight ticket.

2. Payment for the quantity determined above will be made at the unit price per ton bid in the Proposal for Item D-1 which price and payment shall be full compensation for furnishing, hauling, placing and compacting the material; for furnishing and maintaining all site dedicated equipment required to transport, place and compact material in the Dirty Area; for all labor and equipment required in depositing and moving materials from Clean to Dirty Areas; for clearing and windrowing vegetation prior to granular or filter fabric placement; for grading and maintenance of granular site roadways for the Project duration; and all other miscellaneous items for which separate payment is not provided under other items."

- In response to statement of "the tremendous increase in the Work associated with building the road" it should be noted that the lime pit was encountered April 4 and the roadway had crossed the lime pit and reached the remote opening site by April 13. During this period the contractors labor hours averaged 425 hours a week, based on Defenders own "Time and Motion Study" and included the hours for all on-site personnel that would have worked at the site except the Safety Officer, Custodian and security which were paid separately. Therefore, since the contract limits the work to a 40 hour work week the Contractor committed no more than 10 people throughout this time frame.

- Finally, relative to the "delay encountered in building the road," site records show the following chronology:

April 4	-	Lime pit first encountered
April 13	-	Road constructed over the lime pit and completed to the remote opening facility
April 15	-	Remote opening facility completed

April 19 - Roadway completed to Shock Sensitive Facility
April 21 - Shock Sensitive Facility completed
April 22 - First drum moved 8:15 am

NOTE: No drums could be moved until all previously stated work had been completed.

Therefore, the effort to construct the roadway over the lime pit (which was the segment of the road that was outside the scope of the Contract) required an additional six more working days or nine calendar days. Furthermore, it should be noted that the consultant modified the designs of the Remote Opening E-3 and Shock Sensitive E-5 to accommodate the change of conditions and save time. This modification provided for the Remote Opening Facility to be constructed simultaneously with the road allowing it to be completed only two days later. Again, based on Defenders own Time and Motion Study only an average of 10 people were on site working on both tasks.

Also in both prebid conferences statements were made concerning the work at the site having to be conducted during the rainy season.

3.2.7 CHANGE ORDER REQUEST NO. 7

ITEM 17A: Disposal of Shock Sensitive Waste

Contractor's Request - Defender is requesting additional payment under Item F-17A based upon a material change in the specifications for the execution of the work which resulted in additional costs and delays in the completion of the project. The material changes cited by Defender in making this request are:

1. All work on the site was stopped when shock sensitive and explosive materials were found and also when they were detonated. This caused a loss of labor and time.
2. All "explosives" were labeled as shock sensitives to prevent adverse publicity. This created additional cost as off-site detonation would not have interfered with the site work.
3. The quantity increased from an estimated 200 pounds to 560 pounds. The number of detonations increased to about three times more than estimated and, because of detonating on-site, the increased quantity is not linear to cost and time.
4. Extra precautionary measures were taken that were not listed in specifications.

    a. The Richland County Fire Department had to be on-site with a pumper and personnel to operate it at an hourly charge to Defender.
    b. A representative of the Richland County Civil Defense had to be on-site.
    c. The Westinghouse plant located across Bluff Road had to be notified.
    d. The Richland County Sheriff's Department had to be notified.
    e. The organization named "GROW" had to be notified 24 hours in advance.
    f. All radios were removed from the working area.

5. The detonation had to be scheduled after 8:30 each morning in order

to assure that no school buses would be traveling the Bluff Road. This restriction was established as protocol and caused a considerable loss in labor as working hours were from 8:00 a.m. to 5:00 p.m.

6. General hindrances from "GROW" caused additional cost. At one time a detonation was planned and 30 minutes prior to detonation time DHEC received a court injunction prohibiting the detonation. The detonation had to be cancelled until a court hearing could be held. This required additional labor and time.

The amount of the Change Order requested by Defender under Item F-17A is $17,551.40.

Response to Request - The loss of labor and time during detonation activities is justified, as is the increase in quantities of shock-sensitive wastes. However, the remainder of their claims under F-17-A are not allowable.

There has been no information or justification presented substantiating Defender's claim that explosive waste was encountered and "labeled" as shock sensitive by the RPR to prevent "adverse publicity." Documentation in terms of site meeting minutes and the site chemist's determination are required to substantiate this claim.

Site records indicate that the on-site chemist who was employed as a subcontractor to Defender made all determinations on whether waste was to be classified as a shock sensitive or explosive. Based upon his determination there was no explosive waste found at the Bluff Road site by Defender that was not also shock sensitive.

The increase in the amount of shock sensitive material encountered on-site was paid at the unit price bid for the disposal of shock sensitive wastes under Item F-17A.

Basis: 560 lbs x $7.78/lb = $4,356.80

A Change in Contract Time in accordance with Article 12 should be entertained

and is reasonable based on:

$$\frac{\text{360 lbs (above estimated)}}{\text{5 lbs/detonation}} = 72 \text{ detonations}$$

$$\frac{\text{72 detonations}}{\text{10 detonations/day}} = 7.2 \text{ days.}$$

Considering an average of 10 detonations per day this would result in an extension of Completion Time of 7.2 days.

The extra precautionary measures (see Contractor's Request - 4 b, c, d and f) not specifically listed in the specifications should clearly have been anticipated since it was stated in Section 13575 1.04. A.2 that, "The Contractor shall comply with all applicable regulatory requirements contained in Section 01060 and all other applicable Federal, State or local laws codes and ordinances which govern or regulate hazardous wastes including:

Richland County Fire Department

The Contract Document appended U.S. EPA "Lab Pack Disposal Procedure" states that: "Fire truck will be on-scene during operations and maintain best possible position upwind on range to cover target area."

Richland County South Carolina Permit - Hazardous Subtances

Additionally, under Section 13575: 3.02 B the specifications state:

" Shock sensitive wastes shall be detonated as soon as practical following identification. Detonation shall follow good blasting practices and shall conform to all Federal, State and local regulations."

In Section 01030 Special Project Procedures in 1.0G on page 01030-7 the specifications state:

1. The Contractor shall meet with State personnel, local police, civic

leaders, and hospital and ambulance staffs to explain the remedial action specific work activities.

2. The Contractor shall cooperate with local and State authorities and civic leaders in the formulation of contingency plans to minimize environmental contamination and safety and health risks during remedial action.

It was the Defender's responsibility in bidding this project to know the county requirements. Also as a local firm, experienced in the remediation of hazardous waste sites, such knowledge was expected.

Organization GROW

To provide full disclosure to the potential bidders a memorandum from Mr. Dennis Cannon, Staff Counsel (DHEC) to Mr. Rick Cote (CDM) was requested by CDM and included in the Appendix to the Contract Documents. This memorandum summarized an August 5, 1982 court proceeding involving the Grass Roots Organizing Workshop (GROW) regarding the detonation of certain chemical waste from the Bluff Road site and included the following:

> " The Court inquired as to whether DEHC would be willing to provide the Petitioners with a list of chemical waste that would be subject to destruction by detonations should the need arise in the future,and DHEC representatives stated that such information would be provided. The Court stated that once Petitioners were provided with this information, they could undertake whatever legal action it deemed appropriate to ensure public safety prior to the implementation of the proposed destruction procedures."

The Petitioners were GROW. The facts concerning the GROW organization are:

1. GROW stopped the detonation once and DHEC responded to the court injunction while Defender was allowed to continue with other site activities.
2. The schedule detonation was delayed only one day.
3. DHEC assumed Defender's responsibility to notify GROW concerning all

subsequent detonations and this was accomplished with no further delays to the work.

4. The requirement to schedule detonations after 8:30 am to insure that no school buses would be traveling Bluff Road was a County requirement and should have been known to Defender based upon the Contract Documents requirements to conform to all County local laws, codes and ordinances.

3.2.8 CHANGE ORDER REQUEST NO. 8

ITEM D-3: Repack Drums

Contractor's Request - The Contractor is requesting a Change Order on Item D-3 because, "DHEC required the purchase of an inordinate amount of repack drums over the actual amount used." Defender purchased 778 repack drums. This claim is based on the following:

- "Even though Defender is entitled to $21,073.00 for the purchase of repack drums, as cited in Weekly Site Meeting #9, it is only asking for the difference between the number of repack drums bought and the number of repack drums Defender has not sold."

The amount of the Change Order requested by Defender under Item D-3 is $9,968.40.

Response to Request - Payments under this Item is for drums used or authorized by the RPR, not the number bought. The unused drums were not authorized. The contract stipulates in Section 1150 - Measurement and Payment the terms under which repack drums are bought and paid for as follows:

"D-3, D-4 Drums

1. Measurement for repack and overpack drums will be made at the actual number of each type drum furnished as determined and authorized by the Owner.

2. Payment for the quantities determined above will be made at the respective unit price bid in the Bid Form for Items D-3 and D-4 which price and payment shall be full compensation for furnishing structurally sound and clean drums. Payment will be made for drums used for repack or overpack where specifically required in the Specifications or when directed in the field by the RPR."

Because this is a unit price item, the total amount of $21,073.00 is not allowable. The Weekly Site Meeting notes presented in context, are as follows:

Meeting #9 - May 6, 1983

"REVIEW OF MINUTES - WEEKLY SITE MEETING #8

Earl Williams asked if minutes of the last meeting were acceptable to those present. Chuck Larson expressed some concern about payment for the additional 100 overpacks which were brought on site to facilitate safety in drum move. It was pointed out that paragraph 4 of last week's meeting covers this concern. It was further discussed that under the Contract Documents there are allowances for 995 repack and 100 overpack drums which equate to a total sum of dollars to $21,073.00. It will be attempted to stay within this dollar figure and adjust the amounts of repack and overpack drums as necessary."

Meeting #8 - April 29, 1983

Paragraph 4:

"... It was agreed that the Contractor would bring another 100 overpack drums on site to facilitate safe drum movement and that the Contractor would make a conscientious effort to reasonably make use of the overpacks where warranted. Since there are a large number of repack drums in the Contract, less repacks would be ordered and the recycled overpacks would be used to repack lab packs for off-site shipment."

3.2.9 CHANGE ORDER REQUEST NO. 9

ITEM E-3: Unknown Lab Pack Component Remote Opening and Disposal Area

Contractor's Request - Item E-3 was modified and reduced the overall cost of the lump sum line item which was paid as a force account. Defenders claim under this Change Order is based on the following:

- A document called Force Account #2 dated May 3, 1983, and a continuation of Force Account #2 was made by a document dated June 3, 1983. The effect of these Force Accounts was to reduce the lump sum Contract Price from $12,912.20 to $2,582.44.

- Defender is requesting a Change Order to pay for the additional costs for materials, equipment and labor to construct and maintain the remote opening and disposal facilities.

The amount of the Change Order requested by Defender under Item E-3 is $4,568.21.

Response to Request - The Force Account cost was developed by the Contractor, based on actual cost of materials and labor incurred at the time the work was performed and the cost and payment specified by the Force Accounts were agreed to, by Defender, at that time. If the Contractor has additional backup and documentation then these costs should be submitted to the Owner.

In response to statement that the large number of unknowns required that a second remote opening, reference attached photo.

CHANGE ORDER REQUEST NO. 9

ITEM E.3: Unknown Lab Pack Components
Remote Opening & Disposal Area

June 1983 photograph showing the Contractor's use of the second remote opening area as a storage area for empty coolers, which were used to transport unknowns. This second remote opening area was suggested by the owner to expedite the processing of unknowns.

3.2.10 CHANGE ORDER REQUEST NO. 10

ITEM E-2: Lab Pack Staging, Sorting and Repacking Area

Contractor's Request - Defender is requesting additional payment under Item E-2 for the following extra work performed:

- "The earthen containment berms were also constructed as required. Prior to initiating berm construction, the existing ground surface had to be thoroughly compacted by mechanical means."

- "The containment and collection box was constructed from 1" thick structural grade plywood covered on the exterior surfaces with a 30 mil sheet of polyethylene. An adequate supply of absorbent soil was maintained adjacent to the structure for refilling the box."

- Defender is also requesting a Change Order because the delay in constructing the road also delayed the site preparation for the Lab Pack, Staging, Sorting and Repacking Area.

The amount of the Change Order requested by Defender under Item E-2 is $3,416.08.

Response to Request - Change Order Request No. 10 under Item E-2 is unwarranted since there was no change in the work as specified.

First, the work as outlined above is defined in the specifications under Section 02100 Site Preparation; Part 3.07, which was paid under Item E-3, as indicated below.

"E-3 Unknown Lab Pack Components Remote Opening and Disposal Area

1. Payment for the Unknown Lab Pack Component Remote Opening and Disposal Area will be made at the lump sum bid price in the Bid Form for Item E-3 which price and payment shall be full compensation for fine grading of existing ground; clearing and windrowing vegetation;

supply and placement of fill for berm construction; fire extinguishers and emergency eye wash and shower; material supply, construction, and maintenance of detailed containment and collection box including provision of adequate quantities of absorbant soil from on-site or off-site sources; and provision of labor to control access to the area during remote opening activity. The Site Security Officer shall not be employed for this duty."

Secondly, the work specified under Item E-2 is related to the work done in the buildings which are located in the front of the site, ahead of the lime pit, as shown on the Contract Drawings and should not have been impacted by the road construction.

3.2.11 CHANGE ORDER REQUEST NO. 11

ITEM C-1: Safety Officer

Contractor's Request - Defender is requesting an additional five day extension of the unit price for the Safety Officer.

The amount of the Change Order requested by Defender under Item C-1 is $1,500.00.

Response to Request - Extensions of the unit price for additional days for the Safety Officer is allowable, if a time extension beyond the 90 day contract period is documented and approved.

3.2.12 CHANGE ORDER REQUEST NO. 12

ITEM C-2: Custodian

Contractor's Request - Defender is requesting an additional five day extension of the unit price for the Custodian.

The amount of the Change Order requested by Defender under Item C-2 is $180.00.

Response to Request - Extensions of the unit price for additional days for the Custodian is allowable, if a time extension beyond the 90 day contract period is documented and approved.

3.2.13 CHANGE ORDER REQUEST NO. 13

ITEM D-2: Filter Fabric

Contractor's Request - Defender is requesting additional money to cover the cost of filter fabric used at the site. Two points made by Defender were:

- The payment for the filter fabric is indicated in Weekly Site Meeting No. 5 dated April 8, 1983, which states "In the event that a whole roll of filter fabric should be left over due to the decrease in road length, the Contractor is to check and see into a supplier restocking charge."

- The amount purchased was 1800 square yards which was 450 square yards more than the "estimated quantity" in the Specifications. The material was purchased in 600 square yard rolls and smaller rolls could not be obtained. The material was totally used at the site with the extra going into the roadway.

The amount of the Change Order requested by Defender under Item D-2 is $430.02.

Response to Request - The intent of the two statements is unclear. If additional material was requested by the Engineer but not used, then restocking charges should be paid. However, if the additional 450 square yards was used, the specifications clearly provided for payment.

"D-2 Filter Fabric

1. Measurement or filter fabric will be made in square yards at the actual number of horizontal square yards in place as determined and authorized by the RPR."

Since the additional 450 square yards were used on-site, Defender is entitled to payment for additional yardage based on the unit price of $0.69 per square yard.

$0.69 per square yard x 450 square yards = $310.50

The discrepancy between this bid price amount of $310.50 and the requested amount of $430.02 is not presented.

3.2.14 CHANGE ORDER REQUEST NO. 14

ITEM F-2: Disposal of Water Reactives

Contractor's Request - Defender is requesting additional payment to cover unforseen costs associated with the handling and disposal of chlorosulphonic acid, as follows:

- "This waste was chlorosulphonic acid which is highly corrosive and which can only be stored in teflon-lined containers or solid stainless steel containers."

- "After locating a stainless steel shipping container, a disposal facility had to be found that would accept this highly dangerous acid. The closest facility was Frontier Chemical in Niagra Falls, New York."

The amount of the Change Order requested by Defender under Item F-2 is $3,309.35.

Response to Request - It is understood throughout the industry that water reactive wastes, as defined by 40 CFR, produce violent reactions when mixed with water and produce toxic gases or fumes. The extra handling requirements of such a waste should be taken into account when bidding. Two points should be made regarding the aforementioned requests.

First, if the cost of the special container for this specific waste was not provided for in the development of Defenders bid then consideration should be given to additional payment for this special container.

The second point, however, concerns the transportation and disposal costs of this waste. As part of the bidding requirements in Section 300 the Contractor was required to submit listings of construction services (subcontractors/ suppliers) and other services (firms designated to perform pretreatment or ultimate disposal of waste). Defender listed the Chem Waste facility in Alabama for waste disposal. Upon later review it was determined that this

facility was not permitted for water reactive wastes. It was Defender's responsibility to identify a waste disposal site for water reactive wastes as specified. The fact that the Alabama facility cannot accept water reactive wastes is not a responsibility of the Owner.

3.2.15 CHANGE ORDER REQUEST NO. 15

ITEM E-4: Decontamination Facility

Contractor's Request - Defender is claiming that the additional use of the Decontamination Facility warranted additional cost, based on the following:

- "This facility experienced almost three times as much activity as had originally been planned, generating 105,562 gallons of contaminated effluent instead of the 39,700 gallons as shown in the specifications. This required a great deal more maintenance on the facility including the pumps, steam and washing equipment, hoses and pressure guns."

The amount of the Change Order requested by Defender under Item E-4 is $3,615.19.

Response to Request - Item E-4 covers the construction of the Decontamination Facility as a lump sum item. The use of the facility for the decontamination of equipment was paid on a per gallon basis under Item F-20, which is the subject of Change Order Request No. 21. The payment for Item E-4 was based on:

"E-4 Equipment Decontamination Facility

1. Payment for the Equipment Decontamination facility will be made at the lump sum bid price in the Bid Form for Item E-4, which price and payment shall be full compensation for fine grading of existing ground; supply and placement of fill and granular material as required or specified; reinforced concrete wood timbers; supply and installation of the drain piping from the equipment decontamination facility to the collection and pumpage wet well including excavation, backfill, and granular material as required and connection to the wet well; supply and placement of the 48" Ø reinforced concrete wet well including dry mix concrete levelling course, excavation, and backfill; and supply, installation, and maintenance of the wet well pump including electrical service."

If Defender incurred additional maintenance costs associated with extended operation of the decontamination facility and wet well including electrical service these should be submitted to the Owner for review.

The payment for the disposal of the wash water generated by this facility was included for payment under Item F-20 - Disposal of Base Neutral Aqueous Wastes. The per gallon price paid under this item was to include the decontamination as stated:

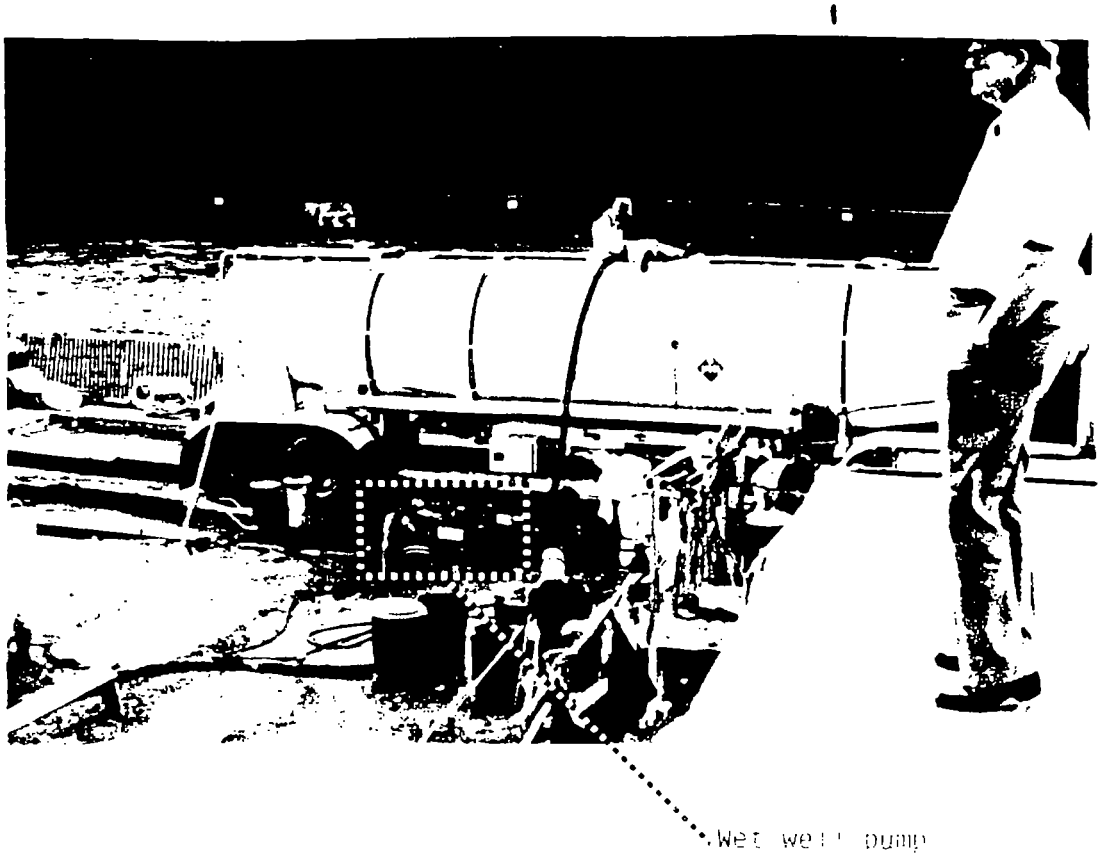
Therefore, Defender should have included in this unit price the decontamination equipment and related maintenance. Additional costs associated with the extended decontamination required beyond that included in Defenders original unit bid price should be documented and submitted under Item F-20, which is discussed in Change Order Request No. 21

Additionally, any increase in cost associated labor more specifically relates to the contractor's manner of operation

Contract Documents specified that an automatic pump would be installed in the Wet Well. Although the pump was installed, it was not hooked up. The pump shown which was used contributed to the contractors space and site organization problems (reference attached photos).

CHANGE ORDER REQUEST NO. 15

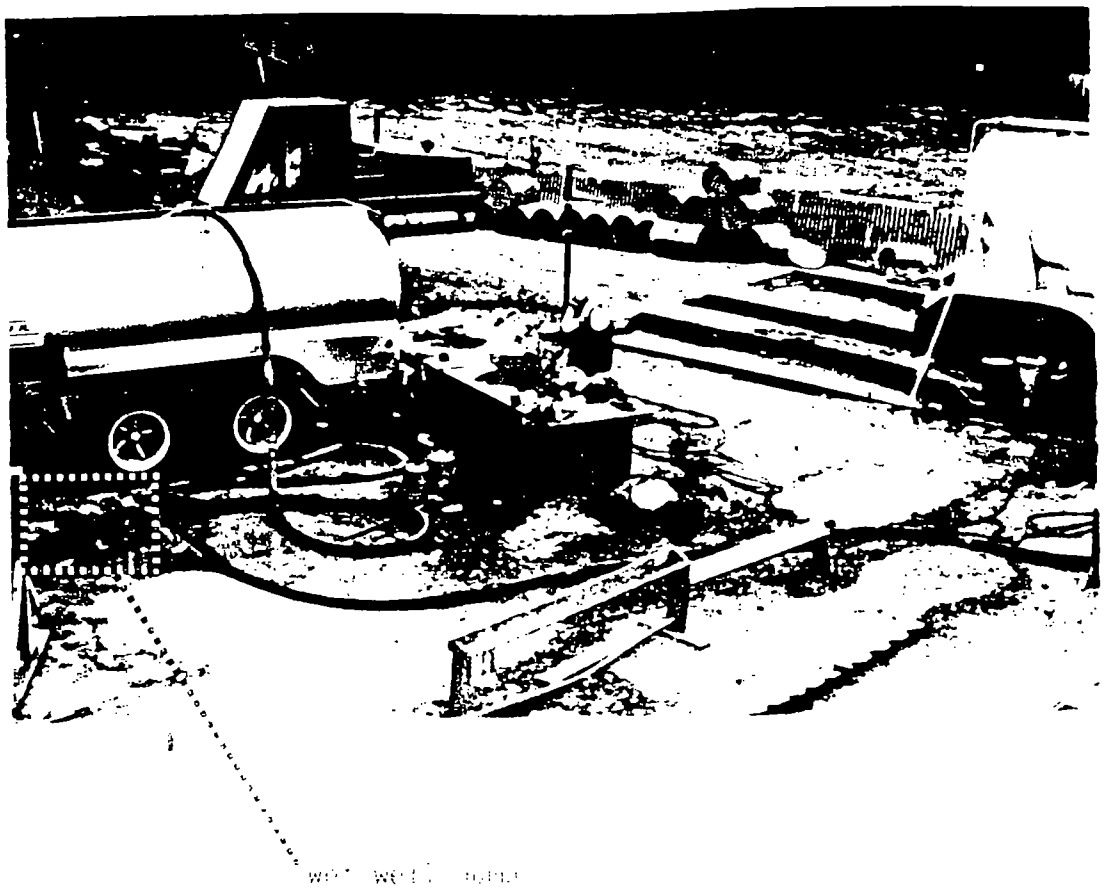
ITEM E-4: Equipment Decontamination Facility with Wet Well and Pumpage System



Contract Documents specified that a pump would be installed in the Wet Well. Although the pump was installed, it was not used. The pump shown which was used contributed to the contractors space and site organization problems.

CHANGE ORDER REQUEST NO. 15

ITEM E-4: Equipment Decontamination Facility with Wet Well and Pumpage System



External pump used for wash water not in wet well as specified. The pump shown contributed to the contractor's space and site organization problems.

3.2.16 CHANGE ORDER REQUEST NO. 16

ITEM F-19: Disposal of Empty Drums

Contractors Request - Defender is requesting an increase in the original unit price of $7.59 to $19.53 per crushed drum. This is based on the claim that more work than anticipated was required to handle the empty drums, as follows:

- "The drum crushing operation was delayed because of the tremendously congested working area due to lack of available space. This in turn delayed the removal of empty drums because they could not be crushed."

- "For example, because of limited space, only five or six drums could be placed near the crusher. No more could be staged for crushing or they would be in the roadway and block traffic. These five or six drums would be crushed and placed in the crushed drum dumpster."

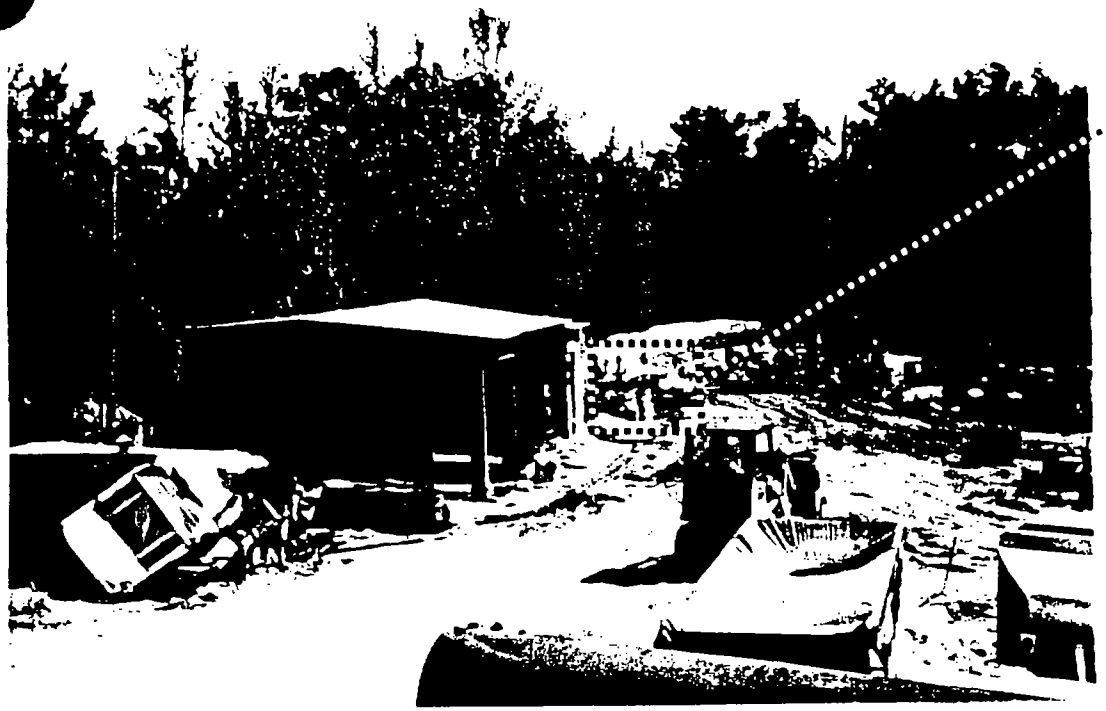
The amount of the Change Order requested by Defender under Item F-19 is $27,010.88.

Response to Request - The delay in the drum crushing operation was not a matter of "congestion" but was due to Defender not having a drum crusher available on-site when required. Drum staging and sampling started April 26; the drum crusher was not delivered until May 9; and it was not until May 18 that the drum crusher was hooked up and operational. Once the drum crusher became operational, it is clear that the work proceeded adequately. The following lists the first week of drum crushing.

May 18 - 52 drums crushed
May 23 - 56 drums crushed
May 24 - 20 drums crushed
May 25 - 61 drums crushed
May 26 - 23 drums crushed

In response to the claim that, "only five to six drums could be placed near the crusher", the reader is directed to the attached photographs showing substantially more than six empty drums stored on site.

ITEM E-19: Disposal of Empty Drums



April 1985 photograph showing location of staged empty drums.

May 1985 photograph showing location of staged empty drums (same as April).

CHANGE ORDER REQUEST NO. 16

ITEM F-19, Disposal of Empty Drums

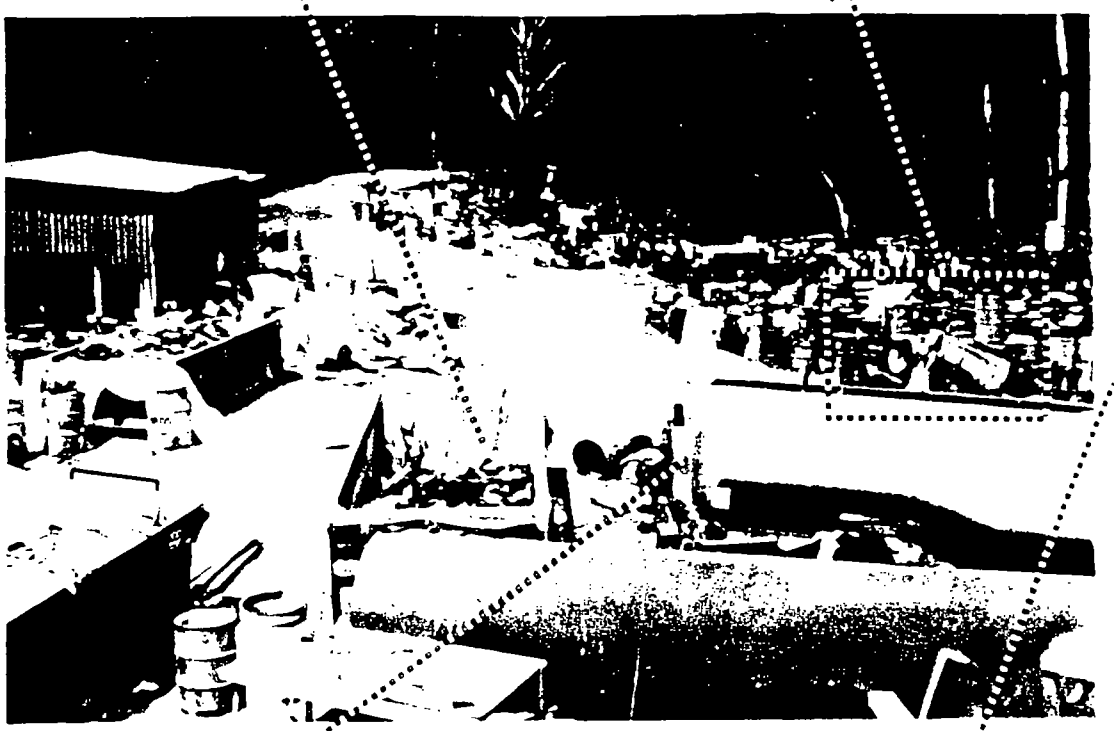
June 1983 photograph showing location of staged empty drums (same as April). Contractor's claim that empty drums could not be processed and were blocking roadway due to lack of space. The series of three photographs reflect the availability of space and an indication of the Contractor's problems with on-site operations.

FIGURE 16-1: CHANGE ORDER NO. 16

ITEM F-19: Disposal of Empty Drums

Dumpster for disposal of crushed drums

Piled drums in excess of 10 feet



Contractor's location of drum crusher

Photograph date of June 1983 is one month after the installation date of drum crusher on May 1983

3.2.17 CHANGE ORDER REQUEST NO. 17

ITEM F-7: Organic Liquids, High Halogen

Contractor's Request - Defender is claiming an increase in unit price for the disposal of organic liquids, high halogen, from $2.90 per gallon to $4.17 per gallon based on:

- "As manifested, 3,410 gallons of this waste were disposed of at a facility in North Carolina at a total of $2,216.50. This did not include the transportation cost for shipping this waste to North Carolina nor did it include a proportionate share for laboratory analyses."

The amount of the Change Order requested by Defender under Item F-7 is $13,117.92.

Response to Request - Defender cites analytical, transportation, and disposal costs as the basis for the requested unit price increase. The specifications under Section 1150 - Measurement and Payment clearly include these items:

> "F-7 Disposal of High Halogen Concentration Organic Liquids
>
> ... payment shall be full compensation for ... laboratory testing; drum handling including repacking or overpacking as required on-site treatment including bulking of wastes; off-site treatment and disposal; transportation of wastes from site to location of final disposal; ..."

Based on the above, Defender must have included the costs of analytical testing, transportation and ultimate disposal in the development of the unit price for Item F-7. There is no substantiation made by Defender for changing the disposal site from the Alabama facility to North Carolina and it is unclear how a reduction in transportation distance provides a basis for increased cost.

3.2.18 CHANGE ORDER REQUEST NO. 18

ITEM F-5: Disposal of Strong Oxidizer Liquid

Contractor's Request - Defender is requesting an additional $18,506.24 to cover the extra handling cost associated with strong oxidizers, as follows:

- "The disposal of these wastes had to be done very slowly and cautiously because of their corrosive nature and the heat buildup when transfer is made."

- "A chamber was used, in one situation, to store bulked oxidizers prior to pumping into tankers for transportation to disposal sites. The reason was samples had to be taken of composite bulking and approximately three days would elapse before these results were known."

- "However, these oxidizers were of such a corrosive nature that the welds of the chamber were literally "eaten" away and the liquid had to be pumped into the expensive tanker."

The amount of the Change Order requested by Defender under Item F-5 is $18,506.24.

Response to Request - The Contractor is citing on-site handling problems as the cause of increased cost.

First, in accordance with Section 13573 Bulking and Consolidation Protocol, strong oxidizers are segregated from the "bulking" protocol, and are specifically isolated as incompatible waste for "special" handling. Any material that causes such a rise in temperature as stated, should not be bulked.

Second, the use of a chamber for composite sampling was the choice made by the Contractor. Nothing precluded the Contractor from composite sampling from the original drums eliminating the basic need for the chamber. The three day time

frame for sample analysis was known to the Contractor at the time of bidding and should have been taken into account.

Finally, if the oxidizers were of such a corrosive nature, the individual repacking of this material would have been a far more prudent and cost-effective approach, (calculations 1115 gal ÷ 55 gal - 21 repacks).

21 repack drums x $15.60 per drum = $ 327.60

3.2.19 CHANGE ORDER REQUEST NO. 19

ITEM F-8: Disposal of Aqueous Acids

Contractor's Request - Defender is requesting an additional $29,966.50 to cover stated extra work as follows:

- "The high acidity and corrosive properties encountered in handling this waste caused excessive wear and tear on all handling materials."
- "The conditions encountered which include a high number of deteriorated drums (which made them difficult to handle) and lack of space, staging these acids had to be done ususally more than once."
- "The amount of acids found was less than original estimates."

The amount of the Change Order requested by Defender under Item F-8 is $29,966.50.

Response to Request - A contractor experienced in handling hazardous wastes is unlikely to be surprised by the "acidity and corrosive properties" of aqueous acids. Defender asserts that the strength of the waste caused a change of conditions.

The specifications specifically call for Aqueous Acids holding a pH of less than two to be "isolated". This includes only that material within a pH range of 0-2, and there is no question that material of such a strength would require special handling and equipment.

It is not unusual, in fact expected, on an abandoned hazardous waste site to find poly pack drums (lined drums used to hold strong acids) to have the outer steel drum body corroded away. However, drums in such a deteriorated condition should not be handled more than once. In both pre-bid conferences we stressed the deteriorated conditions of the on-site drums. Also in our Contract Documents, both plans and specifications stated that 218 poly pacs were identified on-site and the locations were noted on the plans.

If the quantity found (3769 gals.), is less than the original estimate (7,205 gals.), then the Contractor could be entitled to additional payment for "fixed costs" based upon an audited review, since the quantity over which these fixed costs can be spread has been reduced. However, the basis of the Change Order Request is unclear considering the fact that even if all of the estimated quantity were found, the cost would only total an additional $6,013.00 (7,205 (estimated gals.) - 3,769 (actual gals.) = 3,436 gal x (Bid price) $1.75/gal = $6013.00). This is still less than the $13,434.56 that is being requested.

3.2.20 CHANGE ORDER REQUEST NO. 20

ITEMS B-1 through B-5: Temporary Facilities

The Specifications, Section 01590, required the following facilities to be furnished on the site:

B-1	State Site Office
B-2	Security and Communications
B-3	Laboratory
B-4	Emergency Medical Facility
B-5	Personal Hygiene Facility

These facilities were quoted as a lump sum bid price per line item based on the original 90-day Contract.

Contractor's Request - Defenders claim for an additional payment of $20,191.26 is based on the following:

- "Due to the increase in Work, it was necessary for these facilities to remain on the job site 134 days. This is 44 days more than the 90 days in the original Contract."

Response to Request - The Contractor is entitled to payment for any documented extensions of time beyond the original 90-day contract time during which these facilities were required to be on-site.

3.2.21 CHANGE ORDER REQUEST NO. 21

ITEM F-20: Disposal of Base Neutrals

Contractor's Request - Defender is stating that the increase in quantity of washwater resulted in additional equipment costs.

- "This can be seen by the large number of gallons of washwater used (105,562 gallons). One steam jenny was completely worn out and another nearly worn out."

The amount of the Change Order requested by Defender under Item F-20 is $12,231.70.

Response to Request - The cost for decontamination and disposal of the generated washwater are paid on a per gallon unit price basis, and fixed costs for equipment should be included in the unit price bid.

"F-20 Disposal of Base Neutral Aqueous Wastes

1. Measurement for the disposal of neutral aqueous waste, less than 50 ppm PCB, no cyanides or sulfides, including decontamination and wash waters will be made in gallons at the actual number of gallons disposed of as determined by the Owner.

2. Payment for the quantity determined above will be made at the unit price per gallon bid in the Bid Form for Item F-20, ..."

The Contractor is paid equally for every gallon that is produced and properly disposed of during decontamination independent of how much decontamination takes place or even how many times the same vehicle is decontaminated.

The only unknown factor is how the Contractor carried the "fixed cost." Such a determination can only be made based on the original cost breakdowns detailed in the "Certified Bid Form", which has been unavailable.

Additionally, it should be noted that a portion of the gallonage was a direct result of inadequate maintenance of the steam jenny by Defender as described in the site meeting notes:

Site Meeting #24 June 6, 1983

"The steam cleaner is leaking and is contributing approximately 900 gallons per day as tested by Cote and Engler on Saturday. The Contractor said that this will be repaired immediately. The State noted that some adjustment will have to be made in the cost under this item to compensate for the overrun."

Site Meeting #29 June 15, 1983

"During this meeting, the steam jenny for de-coning broke down. This should be repaired immediately."

Site Meeting #31 June 16, 1983 - 7:00 a.m. Thursday

"There will be a new steam jenny on-site tomorrow."

Site Meeting #32 June 20, 1983

"It was noted that the new steam cleaner has not yet arrived on-site. It is the opinion of the State that they don't care if a new steam cleaner is brought on-site or the old one repaired so that it does not leak anymore. The Contractor will check into this item since he stated that this has already been bought and paid for."

An approximation of the loss due to this leakage is 5,000 gallons.

3.2.22 CHANGE ORDER REQUEST NO. 22

ITEM A-2: Mobilization

Contractor's Request - Defender is requesting $9,914.10 for work they claim is beyond the scope of the mobilization line item.

- "Upon entering the property to commence the cleanup operation, a large area of soft, mushy soil was discovered on the south side of the site. Further inspection revealed that this soil would not support the heavy equipment necessary to conduct the cleanup. This necessitated scraping the soil away, recompacting the soil and placing it back in a manner which would support heavy equipment."

- "The contaminated soil was scraped into a pile in the hot zone and secured until eventual shipment off-site for proper disposal."

- "An additional backhoe and an additional grader were required to manage the soft soil and the contaminated soil."

- "Unusual and unexpected rainfall during the mobilization phase resulted in equipment sitting idle and in personnel who could not perform their work. The mobilization phase extended from February 14, 1983 (the effective date of the Contract) until the week beginning May 2, 1983 and was greatly impacted by the rainfall."

Response to Request - Much of the requested payment has already been paid under E-9 rather than A-2. In addition, site records do not substantiate the impact due to rainfall.

The entire front of the site was covered by a liner prior to the installation of the site trailers. The cost to scrape, grade and compact this area was paid under Item E-9.

Finally, site work did not start until February 23 after the Health and Safety Plan was submitted. The liner was in place March 3 followed by the placement

of the trailers, completed March 11. During this time, it rained only 3 days and one rain day was on the weekend.

3.2.23 CHANGE ORDER REQUEST NO. 23

ITEM D-5: Common Fill

Contractor's Request - Defender is requesting payment for an additional 1,283.27 cubic yards of common fill, which their records indicate was the additional amount used on the project in both the clean zone and in constructing the roadway in the dirty zone.

Also, because of the problems found in the construction of the roadway, some of this common fill was required in overcoming the problems when the lime pit was discovered.

The amount of the Change Order requested by Defender under Item D-5 was $6,698.67. During the progress of the administrative hearings held in Columbia, SC in December 1982 on this request for Change Orders this request was dropped.

Response to Request - We agree with Defender that this claim has no merit and should be dropped.

Defender apparently included the specified 12-inches of common fill (which was placed in conjunction with the installation of the liner and paid for under the lump sum bid in Item E-9, Site Preparation for Temporary Services Location), in the amount requested under Item D-5. This is obviously incorrect.

Section 1150, Measurement and Payment states:

"E-9 Site Preparation for Temporary Services Location

1. Payment for site preparation for the temporary services location will be made at the lump sum bid price in the Bid Form for Item E-9 which price and payment will be full compensation for furnishing and constructing the site preparation as detailed on the Drawings and Specifications including; supply and placement of liner; supply, placement and compaction of imported fill."

Defender's assertion that common fill was used to overcome problems in the lime pit area also has no merit and we agree that it should be dropped. No fill was ever used in the lime pit area as stated as substantiated by the site records which show that the last load of common fill was delivered to the site March 29 and the lime pit was not encountered until April 4.

3.2.24 CHANGE ORDER REQUEST NO. 24

Contractor's Request - Defender is requesting payment for the processing and disposal of forbidden materials as specified in Section 13579 - Sorting, Identification, Packing and Disposal of Packaged Laboratory Chemical Wastes (Lab Packs) and in Section 13580 - Securing, Identification, Transport and Disposal of Pressurized Cylinders Containing Toxic, Explosive and/or Other Materials.

Defender has claimed that due to the dangerous properties of these chemicals, no standard licensed hazardous chemical waste facility could accept them for disposal. Therefore, Defender had to locate a specialist who dealt in the disposal of these items and who was permitted to handle them. The discovery of these items on-site was unexpected and increased the Work. Although Defender retained an expert to oversee the management of this waste, Defender's employees had to actually pack these materials under his supervision.

The amount of the change order requested by Defender for this additional work is $17,404.03.

Response to Request - The Contract Documents are very specific concerning forbidden materials in lab packs. The basis is that materials that are highly reactive, persistent or highly toxic and should not be just repacked for storage in the environment but rather they should be treated or segregated to stabilize them.

In Section 13579 on page 13579-2 in Subsection 1.04B, the specifications very clearly define forbidden materials:

"4. The following types of materials may not be packaged in a lab pack for disposal.

Explosive or shock sensitive material	(49 CFR 173.50)
Oxidizing agents	(49 CFR 173.151)
Pressurized gas cylinders	(49 CFR 173.301)
Water reactive materials	(40 CFR 261.230)

Radioactive materials	(49 CFR 172.310)
Ignitable materials	(40 CFR 261.21)
Substances that evolve toxic gases when mixed with water (i.e. cyanides, sulfide salts)	(40 CFR 261.23(4))
PCB's	
Dioxin	"

In Subsection 3.01G of the same section the method of treatment of these wastes is described:

"G. Materials that may not be packaged in lab packs (1.04B(4)) shall be transported to appropriate areas on-site for stabilization, treatment, and consolidation as required."

In addition Section 13580 dealt entirely with pressurized cylinders and specifically mentions phosgene which was found on the site.

Also Section 13572 Drum Sampling Protocol refers to forbidden materials in Subsections F and G as follows:

"F. Packaged Laboratory Wastes (Lab Packs)

1. Drums may also be encountered that contain numerous small volume individual containers of laboratory reagents, solvents and other miscellaneous material packed in some absorbent filler. Lab packs usually are 55 gallon or larger, metal, fiber or plastic drums with removable lids. Lab packs routinely encountered at uncontrolled hazardous waste sites usually contain small individual containers of incompatible materials and in some cases shock sensitive reacting or explosive materials. Lab packs shall be isolated on-site in an area designated for the sorting and resorting of lab packs and for the treatment, consolidation and stabilization of shock sensitive, explosive, reactive and ignitable materials identified and isolated during this activity.

G. Gas Cylinders

1. Gas cylinders when encountered shall be stored and disposed of on a specific case basis, depending on the integrity of the cylinders and type of substance they are expected to contain."

As presented in Section 01150 - Measurement and Payment, the method of payment

for forbidden materials found in lab packs as presented is very specific.

"F-18 Disposal of Lab Packs

1. Measurement for the disposal of packaged laboratory chemicals will be made at the actual number of drums containing packaged laboratory chemicals including gas cylinders identified on-site by the RPR prior to sorting or repackaging."

It is our understanding that all forbidden materials encountered in lab packs qualified for payment in this contract under another item with the exception of the gas cylinders found in Lab Packs which as indicated above were specifically identified for payment.

Defender asserts that the discovery of these items on-site was unexpected. Based upon the information referenced above, which was presented in the Contract Documents and at the preconstruction conferences where it was stated that gas cylinders were previously found on site by TRI during their cleanup: The Contractor should have anticipated encountering these materials and prepared his bid accordingly.

Also in the letters from Mr. Malpass, DHEC to Mr. Boyd of Richland County Civil Defense which summarized the materials removed from the Bluff Road site by TRI, forbidden materials such as flammable liquids, nickel carbonyl gas and lithium metal were listed. These summary letters were included in the Appendix of the Contract Documents for the Contractor's information.

The costs associated with the handling and disposal of the four (4) gas cylinders which were found on the site not in lab packs are not covered under the lab pack unit price. These cylinders were not originally in lab packs they would not be considered for repacking and therefore would not be classified as forbidden materials. Since there was no method of measurment or payment specified for these cylinders found on-site but not in lab packs, we recommend that a change order be negotiated and payment made for these cylinders based upon the actual costs incurred by Defender for the handling and disposal of these cylinders.

3.2.25 CHANGE ORDER REQUEST NO. 25

Contractor's Request - Defender discovered a "vessel" on-site with the form of a metal cylinder about six (6) feet in length and about two (2) feet in diameter.

Based upon safety considerations, the vessel could not be moved until its contents were determined. This required that Defender rent a portable x-ray unit and obtain the services of a skilled technician to x-ray the vessel. After determining through the use of the x-ray unit that the vessel was empty, it was moved and eventually disposed of as Bulk Solids under Item F-14.

Defender claims that the renting of the portable x-ray unit and hiring of a skilled technician to operate this equipment and x-ray the vessel are additional costs due to changes in the work and therefore should be paid under a Change Order.

The amount of the Change Order requested by Defender for this additional work is $1,220.64.

Response to Request - We agree that the activities required to safely manage the vessel were warranted and were additional work. We recommend that this Change Order request be approved and paid based upon an audit substantiation of the costs incurred.